THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

A JOURNAL OF THE

IRON AND STEEL INDUSTRY, THE MACHINERY TRADE AND KINDRED INTERESTS

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CLEVELAND, O., MARCH 17, 1892.

THE WEEK IN IRON CIRCLES.

General Features.

Whatever mitigations are to come of the blowing out of sundry furnaces and the promises that others will soon follow, the pig iron market cannot discount them. The weekly review is apt, therefore, to partake more of the nature of pre-view, and to reflect hopes and forecasts, rather than the history of transactions. General trade conditions have developed no new tendencies, except an incipient money movement from New York banks to the interior in anticipation of April settlements. The bank reserves at New York were lessened about five and a half millions, with only $849,348 in gold demanded for export. Their surplus is still sizeable, and there is no approach toward tightness. With active furnace capacity, the heaviest ever recorded, and a demand that under other conditions would be a prime indication of health, the pig iron market is persistently morbid. The completion of the negotiations pending at New York last week, for the consolidation of heavy Southern producers, quickens speculation as to the effect of the new deal. President Platt, of the Tennessee Coal, Iron and Railroad Company, says it is not a combine, in the popular meaning of the term, but the terms of agreement, given elsewhere in this issue, indicate that it is more than an alliance. The facts at hand do not bear out the view taken by one close observer of the market, that the combination will be beneficial, in that it will prevent the sharp competition heretofore prevailing between its members. That is not so much the question, as what figure the combined Southern giants will cut in the Eastern and Western markets? Pennsylvania producers have already decided for themselves, and the week has seen a drop of from $1 to $2 a ton on standard brands in the Lehigh Valley. There is only one meaning of the reductions in wages of Alabama furnace workers and the concessions in freight rates which the new combination has secured—and that is a continued range of low, possibly lower, quotations. What the aggregated Alabama interests will do in the steel market, which promises also to be a point of attack, is another matter of interesting surmise. There have been a number of additions in the week to the reports of puddling furnace shut-downs, and the wage feature of the situation is getting serious consideration. Stories of sales at unheard-of prices have been plenty in the last few days, but few of them have any substance of fact. The nearest approach to substantiation is the care taken to keep figures from publicity. Louisville reports a few sales, aggregating several thousand tons, at about $9.25 for grey forge at furnace. These have been in the main to pipe works, shipments to begin in May. In general, consumers have bought only to fill contracts already taken. Some furnaces, carrying large stocks, have made very low figures on quick delivery, to turn their metal into money; and this feature has been noticeable, also, in Chicago transactions. Detroit notes a falling off in the large business reported for the week before. There were a a few inquiries that went unfilled, and a few car load lots of Lake Superior charcoal changed hands, but the market was spiritless and prices are unchanged. Cincinnati and Philadelphia have both found that the market has a bottom, word coming from the former of the refusal of $9 for grey forge, in a 10,000-ton lot, and from the latter of the failure of consumers to get any consideration of offers at 50 cents below the lowest Southern prices ever quoted there. Cincinnati quotes No. 3 foundry at $9.75 at Birmingham, grey forge at $9.25, and No. 2 soft at $10 to $9.75. No. 1 foundry of certain brands has been offered at $11.50 or less. Best brands, however, are held at $12. There has been no improvement in car wheel irons and but few sales. Old car wheels are held in the neighborhood of $16. Buffalo sales have ranged from a carload to 100 tons, but the totals are small. Charcoal irons seem to be most in demand. From every center comes the hope that the turning point, long waited for, is at hand, but conservative judgment suggests that, whenever it comes, it will yet be under conditions, as to labor and material costs, that will put prices no great step beyond those of the past few months.

The Local Situation.

A condition of general apathy is prevalent in all the branches of the iron market, and were it not for the struggle between the vessel interests on the one hand, and the shippers on the other, everybody engaged in the pig iron and iron ore industry could well afford to take a long vacation as far as their presence in a business way is concerned. The vessel men's side has been fully stated. They decline, a good many of them, to charter their boats, speculating rather upon the grain to be brought down, and upon the impetus that sort of forced freight must, of necessity, give the vessel market. On the other hand, the ore interests are in no position to pay fancy prices for their output, primarily because the advance of last year's ore prices was only nominal, and for the further reason that some of them think that vessel freights are already too high. Indeed, one firm of shippers regrets the charters it has already entered into for shipments from the head of the lakes at $1.25, being of the opinion that the figure named will be shaded before the season is well under way. The reason given by some of the ore men for their position is found in the extremely poor dispatch given grain-laden craft in Buffalo, which, if true, may have the effect of driving up grain freights, without giving the vessel men a corresponding benefit.

Iron Ore.

An ore seller who has given the market close attention for years, estimates that on the assumption that this year's output will not materially exceed that of '91, the Bessemer sales up to date will figure up in the vicinity of two and a half million tons; but as to the sales of non-Bessemers, all data are missing. The preparations made last year for the importation of a large quantity of Cuban ores are said to have been suspended in the light of recent developments, both as to the price of native ores and the concessions that were expected at the hands of the railway lines leading Westward from the tide water receiving points. With the exceedingly low quotations of prime Lake Superior ores, there is little danger of any encroachments upon their market by any foreign ore, more especially in the light of the high ocean freights now prevailing.

An Agreement Probable.

It is not unlikely that some sort of understanding may be arrived at between the iron ore and furnace interests on the one hand, and the coke men and railway representatives on the other, with a view of arranging some basis of operations under which all the various interests named may do business. As at present constituted, the railways are reaping all the benefits, and the coke men are next in point of profits. To be sure they have been offering concessions of late, but under stress of necessity, and only upon the cessation of furnace activity; but it is believed that a modus vivendi may be arrived at during the coming season of blowing-out, that will help all the interests concerned Upon a previous occasion the coke men made the grievous discovery that they were killing the goose that laid the golden egg, and they may be better disposed at this time to treat with their customers. At all events, there is little doubt that the wage question will receive some attention. There has been little done, thus far, to grade labor in proportion to the diminished price of finished materials, and it is conceded on all hands that some such action is to be one of the results of the situation.

IS IT THE TURNING POINT?

The monthly reports of furnace production in the United States, compiled by the *Iron Age* and the *American Manufacturer*, show the usual slight variations, but agree in stating that the active capacity of furnaces in blast March 1 was greater than at any other time in the country's history. Some insignificant changes had taken place in the month, blowings-in about balancing blowings-out; but while the number of active furnaces had dropped from 308 to 305, as the *Iron Age* had it, or from 305 to 300, as the *American Manufacturer's* compiler makes it, the weekly productive capacity increased from 187,382 tons to 193,903 (*Iron Age*), or from 193,007 to 193,827, using the *American Manufacturer's* table.

In the coke furnace output, with which the special article in last week's issue of *The Iron Trade Review* had particularly to do, the increase has been 5,222 tons over February 1 capacity, according to the *Iron Age*, its figures for total capacity of coke furnaces March 1 being 143,490 tons and those of the *American Manufacturer* 143,704 tons. The announcement in this paper, based on returns from 51 coke furnace firms, representing 80 furnaces, was that 14 coke furnaces either had gone out of blast since March 1, or would do so in the next 30 days. This means a noticeable mitigation of conditions existing at the beginning of the month. Responses received since last week's symposium was put upon the press, add another furnace of 1,000 tons capacity per week, to the list of those that will bank down or blow out within a few weeks. This makes a prospective reduction of close to 12,000 tons a week in coke furnace capacity—enough to be felt, certainly, unless there are off-setting resumptions, which are not to be looked for, except in the possible case of prominent firms, using their own product, that have had a stack or two under repair.

If other furnace owners stick to their expressed intention of blowing out, in case the market does not improve, there is some reason to hope that the April return will show a much closer relation between output and consumption.

'Tis a consummation devoutly to be wished.

ENGLAND AND THE WARRANT GAMBLERS.

The British iron warrant operators, finding their occupation in Scotch warrants gone, have transferred their operations to other fields, not a little to the disquietude of the English iron trade. The bill now in Commons, forbidding the sort of gambling in pig iron warrants, that is carried on in the trade centers of this country, in grain and stocks, is naturally getting the united support of iron and steel producers. The London *Economist* makes this comment:

It is a fact notorious in the West of Scotland that some powerful merchants regularly "smash" hematite warrants, so as to create the impression that trade is dull, and in the hope that that feeling, operating on steelmakers, will enable them to place their engagements in the manufactured article on more favorable terms than otherwise would be possible.

As the London *Iron and Coal Trades Review* says, it is not surprising in view of this state of things, that the producers are making common cause in the effort to put the market beyond the power of the warrant gamblers and their mercantile allies. While the bill now pending in Parliament is only directed against sales of pig iron by one who neither owns any that he can deliver, nor represents any owner, the discussion it is provoking will not go far until it indicts the whole warrant system, *ab initio*. It is the overplus of production, which the warrant system begets and regards as its opportunity, that makes gambling in pig iron possible. If that surplus comes from the exercise of each individual producer's judgment as to the state of the market and the amount he can safely throw upon it, then the responsibility falls upon those most in interest. But when there is an organized effort, outside of producing agencies, to have the production piled up so that the yards of the warrant men may be filled, then the case becomes one of manipulation, at once illegitimate and hurtful. Because it is only an easy step from the warrant storage yard to the pits of warrant gamblers, it is well that the iron interests of the United States be satisfied to get their lesson in this regard by observation rather than by experience.

SMOKE PROHIBITION OR SMOKE REGULATION?

Smoke prevention is coming to be more and more pressing as a problem in city living. Smoke consumers are numerous, smoke preventives not so plenty, yet just as confidently pushed to the fore as solvents of the problem. It is well enough to bear in mind, in discussing this subject, that it is not always the obtrusive evils that are most to be feared. From the hygienic standpoint, the black incense of the factory or the locomotive is not more dreadful because it obscures the sun, and yet its blackness is at the bottom of much of the complaint of the sanitarians. It is no more satisfaction to have one's lungs take up air poisoned by invisible gases, or to be asphyxiated by a gas that does its work so neatly that even one's olfactories give no warning, than to have the work done by an agency dense, black and clumsy.

Capt. Metcalf's allusions to the carbon unguents, that have been at work taking off the sharp corners of lake winds in the industrial cities on our inland waters, are not the least noteworthy points in the synopsis of his recent Pittsburgh address, given elsewhere.

The agitation now upon the country, and especially upon the manufacturers and mechanical experts of its cities, will not end in smoke; nor is it likely to end in smoke abolition; but it ought to end in smoke curtailment.

If the readers of *The Iron Trade Review* are minded to discuss the ways and means of such curtailment, our columns are open to them.

A YEAR'S BOILER EXPLOSIONS.

In its February number, the *Locomotive*, of Hartford, Conn., gives a summation of the boiler explosions of 1891, and their causes. Prefacing its figures with the statement that it depended largely on the daily newspapers for its data and that doubtless many boiler explosions occurred that were reported only in local papers, which it does not see, *Locomotive* comes to its classification. Of the total of 257 explosions, 68 were in saw-mills and other wood-working establishments, 35 were of portable boilers, 27 of locomotives, 23 at mines and oil wells, 17 on steam vessels and 16 at rolling mills, the others being variously distributed. The lives lost were 263, the lowest number in five years; persons injured 371, as against 351 in 1890, 433 in 1889, 505 in 1888, 388 in 1887 and 314 in 1886.

In the same connection, *Locomotive* gives a summing up of the work done in 1891, by the inspectors of the Hartford Steam Boiler Inspection and Insurance Company. There were 137,741 boilers examined in 71,227 visits of inspection. The dangerous defects found were 10,858; total number of defects, 127,609. In 526 cases the inspectors found the defects so dangerous that the boilers were condemned. Of the 10,858 dangerous defects found, leakage around tubes was the most common, 2,877 cases of that nature being reported. Defective rivets come next, with a total of 1,097; and the next most numerous classes are incrustation and scale—676, and fractured plates —672

To what length will the rapacity of our Canadian brethren go? When the *Canadian Manufacturer* said that the building of nickel-alloy armor-plated war vessels by the United States was Canada's opportunity to come down on us with an export duty on the Canadian Copper Company's nickel, one would have thought that the desire to profit by another's necessity would stop right there. But how vain was the hope! The *Manufacturer's* nickel duty refrain was only given in the interval of taking fresh breath to vociferate for an export duty on saw-logs. "The pine forests in the United States are almost depleted, and the mill men there must have Canadian logs. It is a ground-hog case," blithely chirps the *Manufacturer*. Go right ahead, neighbor. If your timber-cutters want the wise men at Ottawa to act on what they hear about the "depleted pine forests" on this side the line, they may rue the day that led them to throw away a market that has in it a dozen consumers for every one that the Dominion's length and breadth can give them. Don't understand though, that this is at all in the nature of advice. Your philosophy is made of sterling protective stuff; no room for doubt about that.

WE note the announcement that there is to be published a "History of Manufacturing in the Western Reserve." Such a work if properly gotten up, would be of great interest and value. Although the Western Reserve is famed for its wealth, intelligence and business push, the real foundation of its greatness rests on its great manufacturing interests. The gentleman undertaking the work, Mr. F. D. Leslie, for many years a resident on the Reserve, and now editor of the *Scientific Machinist*, has had considerable experience with publications of this sort. He makes very emphatic in his circular letter the promise that the work shall be authentic, legitimate and first class in every particular, containing no advertisements, nor anything inappropriate. Mr. Leslie is an indefatigable worker and we shall look for a history of unusual interest.

LEGITIMATE market transactions, based on the developments in the new Mesaba field, will be hurt on the one hand by the extravagant and seductive assays of professional boomers and the operations of wild cat companies. On the other hand, there will be the envious

CONDITION OF THE BLAST FURNACES OF THE U. S.

March 1, 1892.

(CONDENSED FROM THE AMERICAN MANUFACTURER.)

LOCATION OF FURNACES.	CHARCOAL. Total No. of Stacks.	CHARCOAL. In Blast. No.	CHARCOAL. In Blast. Week'y capacity.	CHARCOAL. Out of Bl'st. No.	CHARCOAL. Out of Bl'st. Week'y capacity.	BITUMINOUS OR COKE. Total No. of Stacks.	BITUMINOUS OR COKE. In Blast. No.	BITUMINOUS OR COKE. In Blast. Week'y capacity.	BITUMINOUS OR COKE. Out of Bl'st. No.	BITUMINOUS OR COKE. Out of Bl'st. Week'y capacity.
New England	13	7	652	6	498	.....	.....	.....	.....	.....
New York	8	3	474	5	662	6	4	4,018	2	1,651
Pennsylvania	14	3	205	11	929	2	0	0	2	1,370
Upper Susquehanna Valley	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh	.....	.....	.....	.....	.....	25	24	36,167	1	1,470
Spiegel	.....	.....	.....	.....	.....	1	1	1,454	0	0
Allegheny Valley	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Shenango Valley	.....	.....	.....	.....	.....	17	13	11,524	4	2,440
Youghiogheny Valley	.....	.....	.....	.....	.....	3	1	1,041	2	1,601
Juniata and Conemaugh Valleys	.....	.....	.....	.....	.....	20	11	8,421	9	4,147
Maryland	8	1	124	7	597	5	1	1,400	4	3,373
Virginia	8	1	27	7	479	17	12	7,315	5	2,380
North Carolina	.....	.....	.....	.....	.....	1	1	100	0	0
West Virginia	2	0	0	2	130	4	3	2,913	1	260
Ohio—Mahoning Valley	.....	.....	.....	.....	.....	15	10	10,039	5	5,442
Eastern, Central and Northern	.....	.....	.....	.....	.....	17	14	11,543	3	1,969
Hocking Valley	.....	.....	.....	.....	.....	14	3	1,254	11	2,826
Hanging Rock	11	3	329	8	683	13	6	1,485	7	1,874
Miscellaneous	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kentucky	3	1	386	2	465	5	3	1,402	2	720
Hanging Rock	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Western Region and Miscellan'ous	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee	6	4	989	2	288	13	9	5,020	4	1,928
Georgia	4	0	0	4	711	2	1	742	1	675
Alabama	14	7	1,824	7	1,574	38	25	15,813	13	8,293
Indiana	.....	.....	.....	.....	.....	2	1	268	1	77
Illinois	.....	.....	.....	.....	.....	19	13	18,528	6	8,691
Spiegel	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Michigan	22	10	3,591	12	3,526	.....	.....	.....	.....	.....
Wisconsin	5	4	1,882	1	120	4	2	1,880	2	1,673
Minnesota	.....	.....	.....	.....	.....	1	1	748	0	0
Missouri	2	2	625	0	0	5	1	629	4	3,163
Texas	4	2	442	2	561	.....	.....	.....	.....	.....
Oregon	1	0	0	1	270	.....	.....	.....	.....	.....
Colorado	.....	.....	.....	.....	.....	2	0	0	2	708
Utah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total charcoal and coke	125	48	11,550	77	11,491	251	160	143,704	91	56,731
Total anthracite	156	92	38,573	64	20,645	.....	.....	.....	.....	.....

SUMMARY.

FUEL.	In Blast. Number. Month Previous.	In Blast. Number. Year Previous.	In Blast. Weekly Capacity. Month Previous.	In Blast. Weekly Capacity. Year Previous.	Out of Blast. Number. Month Previous.	Out of Blast. Weekly Capacity. Month Previous.
Charcoal	48	47	50	11,550	10,485	10,204	77	78	11,491	11,708
Anthracite	92	94	93	38,573	39,768	37,514	64	64	20,645	21,057
Bituminous	160	164	107	143,704	142,394	73,027	91	89	56,731	55,684
Total	300	305	250	193,827	193,007	120,745	232	231	88,867	88,449

statements of those whose interest lies in minimizing the new find. There is little danger of a repetition of Gogebic history, at so early a day; but it is safe to say, from the evidence at hand, that some Mesaba stocks will turn out well, as did some of the Gogebics. Wise capital is not apt to rush precipitately after the "Lo, here" and "Lo, there," of the boomers for revenue; but at the same time it does not believe, with the Psalmist, that all men are liars, even though some of them be interested in new ore developments.

THAT Europe has been sending over our securities and putting them on the market, is the common explanation of gold exportation in the face of our enormous crop shipments. But what inspired the return of our securities? Crop failures and industrial depression in Great Britain and other countries, is one theory, and it partly meets the condition. Distrust of our monetary future, in view of the free silver bill's chances, is another. If this latter view be correct, we may look for more gold shipments. It indicates a healthy condition of the body monetary at home, when bank surpluses hold up and money remains easy under such a steady foreign demand for gold. Upwards of $100,000,000 of our securities, Henry Clews says, have been returned to us since the beginning of 1891.

THE effort to get more room for the Patent Office ought to succeed, but congressional red tape has thus far swaddled to death the best drawn bills to that end. Clerks are packed in the basement of the building, without the slighest regard to the first suggestion of hygiene—or humanity, for that matter. Not only is more room needed, but a larger force, to bring the work of applications for patents up to date and keep it there, as well as to take up work absolutely necessary to the future needs of the system. The inventive and industrial interests of the country ought to trumpet in the congressional ear until this crying need gets answer.

THERE is a change in the situation. Not a few furnace men have abandoned the belief that some other furnace's time to rest has come, and are strong in the conviction that theirs is the one.

THE PERENNIAL SMOKE PROBLEM.

Regulation vs. Prohibition—Carbon as a Bronchial Balm.

Capt. William Metcalf's address on "Smoke" before a recent meeting of the Engineers' Society of Western Pennsylvania, brings out some fresh points on a long mooted subject. The extracts below are only sample bricks, but they will serve to reflect not only Capt. Metcalf's position but his admirable style. Pittsburgh has been especially alive on this subject, since the gradual return to the sooty region, with the dropping of natural gas.

"The combustion of coal," said Capt. Metcalf, "involves two processes, first the conversion of the carbon to the condition of gas or vapor, and the second the union of the carbon with the oxygen of the air. This union produces the intense heat so familiar to us all, and the product of combustion when complete is carbonic acid. The difficulty of mixing the gases to produce perfect combustion is so great as to be practically impossible; if we burn all of our carbon to carbonic acid we have inevitably a large excess of air going through our fire, and if we do not burn it all to the carbonic acid in the few moments at our disposal in the furnace, there is a deficiency of air, and the excess of carbon is wasted in the form of carbonic oxide, half burned carbon; or in vaporized carbon which is thrown off with great rapidity in the dense black vapor which we call smoke. In the intense heat of a fierce burning fire bituminous coal is vaporized with such great rapidity that it is impossible, practically, to burn it all before it flies to the chimney and passes beyond the reach of combustion, but much may be done, by steady mechanical firing in small quantities at a time, to reduce the smoke nuisance, where the most intense heat is not necessary, and where other and more important matters do not make other methods of firing imperative. We cannot produce the soft, white radiating flame without some smoke, because we cannot attain an exact balance of the gases, and therefore to maintain such a flame we must have a deficit of air, a surplus of carbon and some smoke. There is no smoke from a blast furnace, because coke is used, but the vapors of a blast furnace are far more deadly than smoke, only they are white and so they do not count.

"When we come to the regenerative furnaces one would say, naturally, here at least there is no excuse for smoke. Many of us thought so, and many of us tried it. I have seen hundreds of valuable crucibles cut down and the furnaces cut down and destroyed in the beautiful blue-white combustion flame, and yet the steel in the crucibles was not melted properly. Tons upon tons of iron and steel have been wasted away in the same beautiful flame, and yet the masses were not heated through nor in the condition to be worked. Now, the invariable rule is, you must have a smoky stack and the evidence of a well-run plant is that the stacks do smoke.

"The most persistent smoker is the boiler, and the reason is obvious—there are no hot walls there to radiate back the heat or to aid combustion. The very object of the boiler is to destroy the fire and rob it of its heat as quickly as possible; therefore, every particle of gas that comes unburned into contact with the boiler shell must float up the stack unburned, surplus of air or not, and add to the volume of smoke. The ordinary boiler fire goes through three stages: The freshly fed—when it pours out dense volumes of the blackest smoke and carries what heat there may be up the stack, and there is mighty little steam raised; the good burning stage—when there is a glorious fire, the boiler steams tremendously and at dangerous speed, and there is but little smoke; the perfect combustion stage—when there is a beautiful clear fire, no smoke, and the surplus air is rushing along and carrying off so much heat that the water begins to rise and the steam to fall. Then the weary fireman opens his doors, rattles out his ashes, shovels in another carload of coal, shuts up his doors and lets her smoke, while he sits down to wipe off the sweat, and if he is a sensible fellow, to smoke a little himself. * * *

"The next thing to consider is what do we lose by smoke. There are smoke consuming devices advertised claiming savings in fuel of from 10 per cent. to 25 per cent. The best authorities I know of give the extreme of loss from smoke as 5 per cent. and the mean loss from average firing as 2 per cent. Therefore, if the devices mentioned do save from 10 per cent. to 25 per cent. of fuel they are misnamed; instead of being called smoke consumers they should be named heat savers. That such saving over ordinary wasteful methods can be made there is no doubt, and if in doing so they save the 5 per cent. that goes as smoke and prevent the smoke, so much the better, provided that in furnace firing they do not burn up ten times this value in iron or steel or valuable refractories, or all three together. It is certain that the best and most economical appliances, will produce a minimum of waste and a minimum of smoke, but not an entire absence of smoke.

"If what has been said is correct, it may be a fair conclusion that some restrictive legislation, wisely planned against excessive smoking might be good for the community, on the other hand, it would be equally fair to say that prohibitive legislation would be sure to defeat itself.

"But there is a health association after the smokers and we must consider the question of the health of the community as it is affected by the smoke. I assert that there is nothing particularly unhealthy about smoke, on the contrary it may mitigate other and worse evils. A reference to statistics will show that this city is not particularly unhealthy, but that on the reverse it enjoys a rather low death-rate. A contemplation of the beautiful clear air of our Atlantic seaboard cities, the most beautiful cities in the world, is apt to fill a Pittsburgher's heart with envy; but in spite of clear air and balmy sea breezes, those cities are not healthier than we are. Their anthracite coal gives off as much carbonic acid, carbonic oxide, sulphurous acids and other poisons as it is possible to get from our bituminous coal. Who that has ever inhaled the burning, biting fumes of anthracite would not infinitely rather have a dose of our blackest smoke? Woe to the weak pulmonary organs that breathe anthracite fumes, there is no unctuous, protecting coat of soft, pure carbon to save them from torture and destruction. A few years ago none but the most robust could hope to live in our windy, dusty, lake cities. Why is it that we have so little of those terrors nowadays? There is no difference, except that we have sent them lots of coal, plenty of smoke, and have painted and protected their

bronchia and appurtenances with a generous coat of our all-protecting carbon."

In the discussion on the paper, Mr. Koch said that he had worked for many years in Birmingham, and that it was a sad sight to see that city to-day, clean in atmosphere and deserted by workmen. The streets may be clean and the smoke gone, but it is because the men who made the smoke are gone. Since steel has taken the place of iron, and puddling has ceased, there is no smoke, for Birmingham to-day only manufactures fine grades of finished product. He indorsed Mr. Metcalf's view that smoke might be lessened, but could not be abolished. When working under Dr. Percy in London, he had to appear before the Committee of the House of Commons as a witness, and it was proven before that committee that every householder delivered four times as much smoke from each square foot of grate surface as any manufacturer. It is easy to reduce smoke from boilers in a mill, running constantly and evenly for 10 hours, such as a cotton mill; but it is impossible to prevent smoke in an iron or steel mill where the boilers are subject to demands for large amounts of steam at one moment, and then suddenly dormant.

Relief by Chemical Treatment.

Mr. Wigham Richardson in his inaugural address before the Northeast Coast Institution of Engineers and Shipbuilders, in referring to the question of smoke consumption, said: "But perhaps the most hopeful direction of all is in the chemical treatment. We know how the heated nitrogen and the carbon oxides, which used to be belched forth from the blast furnaces, are now used to raise steam in the boilers which supply the blowing engines; but Mr. Ludwig Mond, of the firm of Brunner, Mond & Co.—the same who has introduced the Solvay process for making soda, and in so doing has hit many of our friends so hard—has, as I understand, gone much further. He burns his coal with artificial draught, and, conveying the gases into a chamber, he washes them with water spray, which causes every particle of soot or smoke to be deposited, and at the same time condenses and recovers the ammonia (a product of nitrogen and hydrogen) as well as the sulphurous fumes. I trust that I have not misunderstood Mr. Mond's figures, but I gather that to get an equal efficiency of steam-raising power he has to burn 125 tons of coal in place of 100 tons, and for every 125 tons of coal burned recovers four tons of sulphate of ammonia. The fuel, if cheap (say 5s. a ton) will cost £31, and the sulphate of ammonia at £12 a ton, is worth £48. If results such as these can be attained the doom of smoke is sealed."—[London Colliery Guardian.

But What of Anthracite Gases?

Movements are on foot in various quarters having for their object the abatement of the smoke and fog nuisance. The London fogs which descend upon the town are bad enough, but are made almost unbearable to the healthiest and most robust people by smoke. Some interesting facts were elicited at the interview granted recently by the Lord Mayor to a deputation from South Wales which wanted to introduce anthracite coal for house purposes. It was shown that the coal was largely used in Paris, Berlin and other continental and American cities which enjoy an atmosphere absolutely pure compared with London's. The deputation held that anything tending to abate the fog nuisance should be given a fair trial. Sir John Puleston, who introduced the deputation, said that there were 700,000 houses in London, and 1,500,000 chimneys. On a cold day about 40,000 tons of coal were consumed, emitting 480 tons of sulphur. His argument was that anthracite coal was cleaner and cheaper if householders could only be made to understand it.—[National Car and Locomotive Builder.

The Fit Suffer With the Unfit.

For years iron manufacturing has been distinctly a dividend paying branch of business; this distinction does not apply, of course, indiscriminately, because poorly managed or inadequately capitalized concerns are just as sure to eke out a profitless, discouraging struggle in the iron business as they are in any branch. There are some who think that even the well managed and well equipped concerns will have to part with the aforesaid distinction for awhile. There is warrant for assuming that this is borrowing trouble, because there is nothing wrong with the iron business itself; it is overcrowded with incompetents and adventurers, who were induced to pile into it by the Southern boomers, and it is these unfortunates who will have to do the suffering, that must be inflicted before the business can be redeemed from the miserable plight in which it has been dragged by speculative schemers. The remedy will have to be applied and suffering will necessarily follow the application, and those who assume that the least competent, so far as ability and financial resources are concerned, will have to do the suffering, are not nearly so ungracious as are they who merit the suffering by invading a business they were unfitted to engage in. * * * This is not going to be a six months of prosperity in the iron business, and there is warrant for anticipating that, with many, it will prove a season of loss. Of course, the remedy will be applied by degrees, but many, who have really no chance for pulling through, will hang on until they are forced out, and thus the chances for the well conditioned will be prejudiced. It is a clear instance of the fit suffering with the unfit, and a still clearer instance of mismanagement all around.—["Cold Short" in Ohio Valley Manufacturer.

THE Civil Engineers' Club, of Cleveland, gave its twelfth annual banquet at the Hollenden, Tuesday evening, March 15. There were upwards of 200 at the tables, about one-fourth being members of the club. The affair was notable, even in the bright record of banquet successes this club has made. Unique among the table decorations was a huge block of ice, imbedded in which were a dozen miniature incandescent lights, constantly glowing. A dynamo was prominent on another table, and an engineer's transit and a miniature ore-carrier on others. Retiring President Joseph Leon Gobeille was master of ceremonies, and after the toasts introduced his successor, Walter P. Rice. The responses were by President Cady Staley, of Case School, E. P. Roberts, Gen. M. D. Leggett, C. P. Leland, Alex. P. Brown, Prof. Chas. S. Howe and W. R. Warner.

A PERIOD OF LOW PRICES.

NORTHERN AND SOUTHERN IRON MEN PREPARING FOR IT.

The New Southern Combination, with the Help of Lower Wages and Lower Freights, Preparing to Capture the Market—More Letters to "The Iron Trade Review."

Several replies to the circular letter sent out by *The Iron Trade Review* to the coke furnace owners have been received since last week's issue went to press. They agree as to the remedy for the existing glut and indicate that the next 60 days will show a number of additions to the ranks of the inactive furnaces. A well known Pennsylvania pig iron producer writes:

"I purpose 'banking' our furnace for some weeks. You ask my views as to remedy for the depression in our trade. Briefly: Reduce production by general 'banking' of furnaces. In the South, cultivate facilities to convert their pig iron into finished products and seek to build up profitable markets for same in West Indies, Mexico and South America. These should be natural markets for Southern products of both cotton and iron. In the North, cost must be lessened by decreased cost of materials and wages. Our labor organizations will have to learn the lesson that either the wages must be raised in the South, or lowered in the North. I would rather see good wages and the Southern product put in shape for outside markets."

A Western furnace company takes this view of the problem:

"At this time we have no intention of blowing out or banking our furnace. Our opinion of the present condition of the iron trade is that it is very discouraging and that prices are thoroughly demoralized. The only remedy we know of is a general reduction in price of ores, coke and labor, and the permanent stoppage of such furnaces as may not be favorably situated to manufacture at a minimum cost under any circumstances."

From Pennsylvania comes a familiar view:

"Answering your recent circular, would say it is not our intention to blow out or bank down at an early date. We consider the outlook for the iron trade very uncertain. The only remedy we can suggest is for furnaces other than our own to shut down and thus curtail production."

From the Fairchance (Pa.) Furnace Co. comes this response:

"In reply to your circular letter would say, Fairchance furnace is and has been out of blast for the past 18 months. It will not be run again by the present owners and will likely be dismantled."

The Rockhill (Pa.) Iron & Coal Co., who have two stacks of 30,000 tons annual capacity, write:

"One furnace running and will likely keep in blast. One out of blast since January 12, 1892."

Edward A. Low, Treasurer of the Low-Moor Iron Co., of Virginia, says:

"In reply to your favor, we can only say that at present we have no intention of banking or blowing out the Low-Moor furnace; yet, without a large reduction in production and a more active business we can see no prospect of any improvement in prices."

Edward P. Lee makes this report for the Lynchburg (Va.) blast furnace:

"Our furnace has been out of blast for a year past."

The Southern Combine Means Keener Competition.

One of the most significant facts about *The Iron Trade Review's* symposium of furnace men, last week, was the attitude of the Southern furnace owners—their expressed intention to keep right on making iron, in spite of unparalleled output and sacrifice prices. There are reasons for their confidence. In the first place the Birmingham furnace men have nearly all made a 10 per cent. cut in wages, and their employes, appreciating the situation, have accepted it. The Birmingham interests have had a conference, also with railroad officials, and have had assurances of freight concessions that will let them into Northern markets, even at present prices, and still leave a small margin of profit. Added to this, is the influence that will be exerted by the big combination of the largest Southern iron makers. Negotiations have just been concluded in New York, by which the Tennessee Coal, Iron & Railroad Co. and the DeBardeleben Coal & Iron Co. are to be merged in one. The Sloss Iron & Steel Co. that was figured upon as the third member of the combination, representing about one-sixth of the entire interest involved, was dropped out at the last and will maintain its separate existence. The two combining companies represented a capitalization of $19 000,000 in common stock, $1,000,000 in preferred stock and $8,000,000 of bonded indebtedness. The capital stock of what may be termed for convenience the new company, will be $17,000,000 common stock and $1,000,000 preferred stock; $1,000,000 of this $17,000,000 will remain in the treasury. The joint capital stock has been scaled down, not increased. The Tennessee Coal & Iron Co. at present owns 208,000 acres of coal and iron land, chiefly in Alabama, and has ten blast furnaces and 1,950 coke ovens. Its daily output is about 1,000 tons of pig iron and 6,500 tons of coal. The DeBardeleben Co., which is half a dozen corporations consolidated, owns 100,000 acres of coal and iron lands in the Warrior and Cahaba coal basins of Alabama. It has seven blast furnaces and 1,040 coke ovens. Its daily output is 700 tons of pig iron and 3,000 tons of coal.

Hon. Thomas C. Platt, President of the Tennessee Coal, Iron & Railway Co., said, while the negotiations were pending: "It is a harmony of interests that they are trying to establish, rather than a consolidation or a trust or an agreement—a plan of mutual action by which they can strengthen their market and stop making iron to pile up in the yard only. Why, the Tennessee Coal, Iron & Railway Co. can make pig iron at $8 70 a ton, but there is no profit in selling it for $9 50, and we have 55,000 tons we can't sell just now at that price."

Southern Iron in Pennsylvania—And More to Follow.

A Reading (Pa.) dispatch of March 13, gives this advance note: "Since the lowering of prices in the iron market, the large consignments of Southern

pig iron by rail for points in the Lebanon and Schuylkill Valleys have been a subject of remark. The iron comes via Hagerstown and Shippensburg, and is being shipped to a number of points in this section."

Bradstreet's of March 11, says: "For weeks past actual prices of Northern irons have not been made public, so heavily have they been cut in order to meet inroads by manufactures of Southern. Nominal quotations have ranged from $17 to $18 for best grades of Northern, but at last a prominent Lehigh furnace company has taken the bull by the horns and cut prices to $16, $15 and $14, respectively for No. 1 X, No. 2 X, and forge, tidewater delivery. The necessity for this is made apparent when it is known that No. 1 Birmingham, Ala., iron is quoted, Troy, N. Y., delivery, at $15.90."

Noting the comments of the *Iron Age* on the strict economies being practiced by Southern furnace men, their steady reduction of the cost of production and the increased efficiency of their workmen, the Baltimore *Manufacturer's Record* says: "Opportunities for economy in the manufacture of pig iron exist in the South to the extent unknown elsewhere. A manufacturer who controls the supply of all his raw materials is not subject to fluctuations of the markets, and his opportunities for reducing the cost of manufacture are manifold greater than the chances for economy that present themselves to the manufacturer who purchases all his raw materials from other producers. Southern furnaces are nearly all in blast, and their iron is being shipped into the local markets of their distant competitors in the North and West. Southern manufacturers are not sitting down to complain of hard times, but they are making and selling pig iron. Nor are they doing business just for fun. They are seeking profit, and they are finding it; small to be sure, but nevertheless it is there."

Alabama Furnaces Staying in the Race.

The Milwaukee *Sentinel*, of March 14, after making extracts from the furnacemen's letters in this paper last week, adds this computation: "If the same ratio of suspension continues through the half of the coke furnaces not heard from, there will be 28 less furnaces in operation on May 1 than there was on March 1, and production will be reduced about 22,000 tons a week. That would soon turn the attention of buyers toward the accumulated pig iron piles, which, however, would not then be disposed of so that the mills would have to look to the furnace doors for their supply, until well into 1893. It is, therefore, easy to see that a much larger reduction of production will be necessary before any substantial benefits to the trade can be looked for. * * * There is food for thought in the location of the furnaces going out of blast, and in the remarks of some furnacemen who say they will remain in operation. Of those going out of blast only four are in the South, or, more strictly speaking, only two, as two of the four are in Virginia, and the Tennessee and Georgia concerns are not extensive ones. The others are all in the North, Pennsylvania alone having six of them, and in the region where coke ought to be the cheapest. There is nothing in the blowing out list in the Alabama field. The replies to its inquiries which *The Iron Trade Review* publishes from that region do not indicate any contemplated curtailment of production there."

Reductions of Wages and Working Force.

An associated press dispatch from Pittsburg, dated March 14, tells of several shut-downs: "At the Oliver Iron & Steel Co.'s Tenth street mills all the puddling crews have suspended on account of overstock and no orders. The company has curtailed the puddling crews at its Fifteenth street mills. About 250 furnaces are idle as a consequence of the depressed market. The Eagle Rolling Mill in the West End has shut down in every department and the 75 men have been paid off and discharged. Painters' Sons at the West End mill have commenced to retrench also. Sixty-five puddling furnaces were shut down Saturday and the men notified to seek other positions. Almost 100 men have been discharged at the Homestead Steel Works of Carnegie, Phipps & Co., the last three weeks, and on Saturday over 300 more were discharged. The move is one of retrenchment rather than on account of lack of orders."

A dispatch from Norristown, Pa., dated March 9, says: "Hooven's large mill was shut down this forenoon. Over 250 iron workers are thrown out of employment. Mr. Hooven said that the mill had been closed on account of overproduction, and he could not state when it would resume."

A notice has been posted at McHose & Sons' blast furnace, Norristown, Pa., of a reduction in wages. Persons earning $2 a day or over, suffer a reduction of 10 per cent., while in the cases of those receiving less than that sum it is not quite so great.

Notices were posted in the rolling mills of Lebanon, Pa., of a reduction in wages of 12½ per cent., to go into effect March 21. The reduction in the Pennsylvania Bolt & Nut Works applies to the rolling-mill department only. The Lebanon rolling mills reduce the price of puddling from $4 to $3.50 per ton, and other positions in like proportion. At the West End Rolling Mill the reduction will affect puddlers only. It was made to tide over the dull trade and keep the hands employed.

The E. & G. Brooks Iron Co., of Birdsboro, Pa., reduce puddlers' wages from $3.25 to $3 per ton, and all other employes in proportion.

A 10-per-cent. reduction in the wages of the puddlers employed at the Vesuvius Iron Works of Moorhead, Brother & Co., at Sharpsburg, Pa., will go into effect this week, and a similar reduction has been ordered by A. Liggett & Co., machinists and axle manufacturers, of Allegheny City.

The Mellert Foundry Co., of Reading, Pa., has announced a reduction in wages of its employes of from 8 to 10 per cent.

British Miners' Strike Closes Iron Mills.

Latest estimates of the number of miners now out on strike in England put it at 350,000. Owing to the closing down of other industries because of the strike, fully 200,000 men in other employments have been thrown out of work. In the Leeds district the strike is severely felt. Nearly all of the large mills and the iron and steel works are reducing the number of their employes or suspending work altogether. The iron works at Bolton are idle. The Furness Railway Co. has given notice of dismissal to the bulk of its employes engaged in goods traffic. A London dispatch says that Cleveland iron masters are preparing to damp down their furnaces and that the iron and steel works will also close, throwing out 10,000 men.

DEATH OF JOHN F. WINSLOW, BUILDER OF THE MONITOR.

The death of John F. Winslow, at Poughkeepsie, N. Y., March 10, removes a man who was long a prominent figure in the iron world. His name is not only an era-marker in American steel-making, but it stands for a day in naval construction that meant much to the preservers of the Union. Mr. Winslow and John F. Griswold introduced into the United States the Bessemer process of making steel in 1864, and without their efforts, three years previous, the Monitor never would have been built, and naval supremacy in the great conflict might have gone to the Confederacy. Bennington, Vt., was Mr. Griswold's birthplace, and he was born Nov. 5, 1810. After four years of clerkship in various New York commercial houses he became in 1831 the agent of the New Jersey Iron Co. Two years later he engaged in the production of pig iron in Bergen and Sussex counties, New York. Four years later, in 1837, he formed a business connection with Erastus Corning, of Albany, that continued under various names for 30 years, the firm controlling the Albany & Rensselaer Iron Works, and being one of the largest producers in the country of railroad and other iron. Of Mr. Winslow's part in the construction of the Monitor, Mr. James M. Swank says in his "Iron in all Ages:"

"The invention of the Monitor belongs to Capt. John Ericsson, of New York City, but its creation is due to two distinguished iron-masters of the State of New York, namely, the Hon. John F. Winslow and his partner in business, the Hon. John A. Griswold. They were not shipbuilders, had no special facilities for constructing vessels, and knew nothing by experience of the business, and there had never been any iron war ships built in this country;

hence for them to attempt to put afloat any kind of a war vessel was a hazardous experiment. * * * The Monitor would not have been built if Messrs. Winslow and Griswold, who were iron manufactures and men of the highest patriotism, had not pressed upon the government the adoption of the inventor's daring scheme and afterwards furnished the means to secure the construction of the vessel."

In spite of an adverse report on Ericsson's plans by the special naval board on ironclad construction, Messrs. Winslow and Griswold so strenuously urged the Monitor project that the decision to build it was finally reached, but the government required a guarantee that if the vessel failed in any particular, Messrs. Winslow and Griswold should refund to the government all the money advanced in construction. About $50,000 was lost on the Monitor, but contracts were let by the government to these same men for six more turreted ironclads, as soon as the Monitor's success was assured.

Mr. Winslow and Mr. Griswold, in 1864 purchased in England the exclusive right of the Bessemer process of making steel in America, and at once sent Alexander G. Holly, whose statue now stands in Washington Square, to Europe to study the various Bessemer steel plants. Steel rails were made at the Troy mills, the first in the United States, and at that time steel rails were valued at $112 a ton. From 1863 to 1867 Mr. Winslow was president of the board of trustees of the Rensselaer Polytechnic Institute of Troy. In 1867 he went to Poughkeepsie and purchased a beautiful place on the Hyde Park Road which he made one of the suburban attractions of the city. He at once interested himself in local business enterprises, became one of the promoters of the Poughkeepsie & Eastern Railroad, and at one time its president, and when the Poughheepsie Bridge Co. was chartered he was one of the incorporators and was chosen the first president of the company. In 1888 he was a presidential elector on the Republican ticket, and as such voted for Mr. Harrison.

BURTON'S ELECTRICAL FORGING PROCESS.

The production of heat by electricity is creating a distinct field of invention, that electrical experts are not slow to enter in and possess. Electric welding has already taken its place in the industrial ranks as a process that is here to stay; electrical warming of houses and cars, and the production of heat for culinary purposes are making their way to a permanent place. Another process, whose success is already demonstrated, is that of electrical forging—the heating of metals to such a temperature that they can be readily forged by machines connected with the electrical apparatus. This is an entirely different operation from that of electric welding. It is the invention of

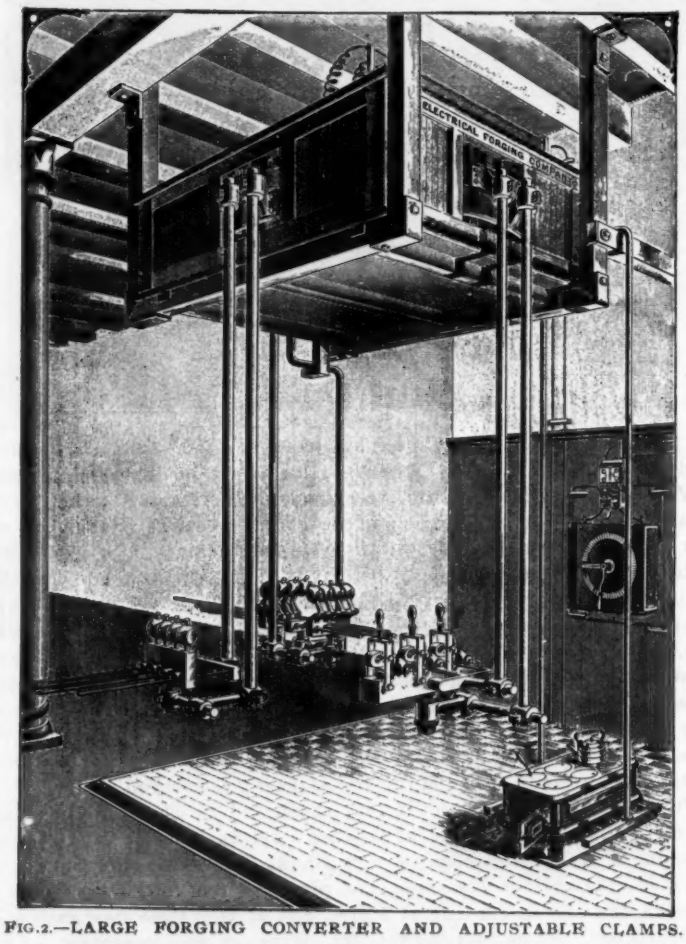


FIG. 2.—LARGE FORGING CONVERTER AND ADJUSTABLE CLAMPS.

George D. Burton, of Boston, who is now credited with 100 patents. He is known to the country at large through his invention, in 1880, of the car for the humane shipment of live stock over long hauls.

The practicability of the process covered by Mr. Burton's invention has been fully demonstrated during the past year by the Electrical Forging Co., under which title the Burton Co. is known, at their factory, 163-169 Oliver street, Boston. The Electrical Forging Co. was organized February, 1890, with a capital of $2,000,000, divided into 20,000 shares.

Instead of heating the metal at the ends for the purpose of effecting union between two pieces of metal, as in electric welding, the electrical forging process is to heat, if required, a solid bar, rod or blank, of a determined size or length, in its entirety, and, when properly heated, the bar or rod is passed automatically between dies, rolls or other shaping devices, for the purpose of giving the necessary shape to the thing produced. Both the constant and

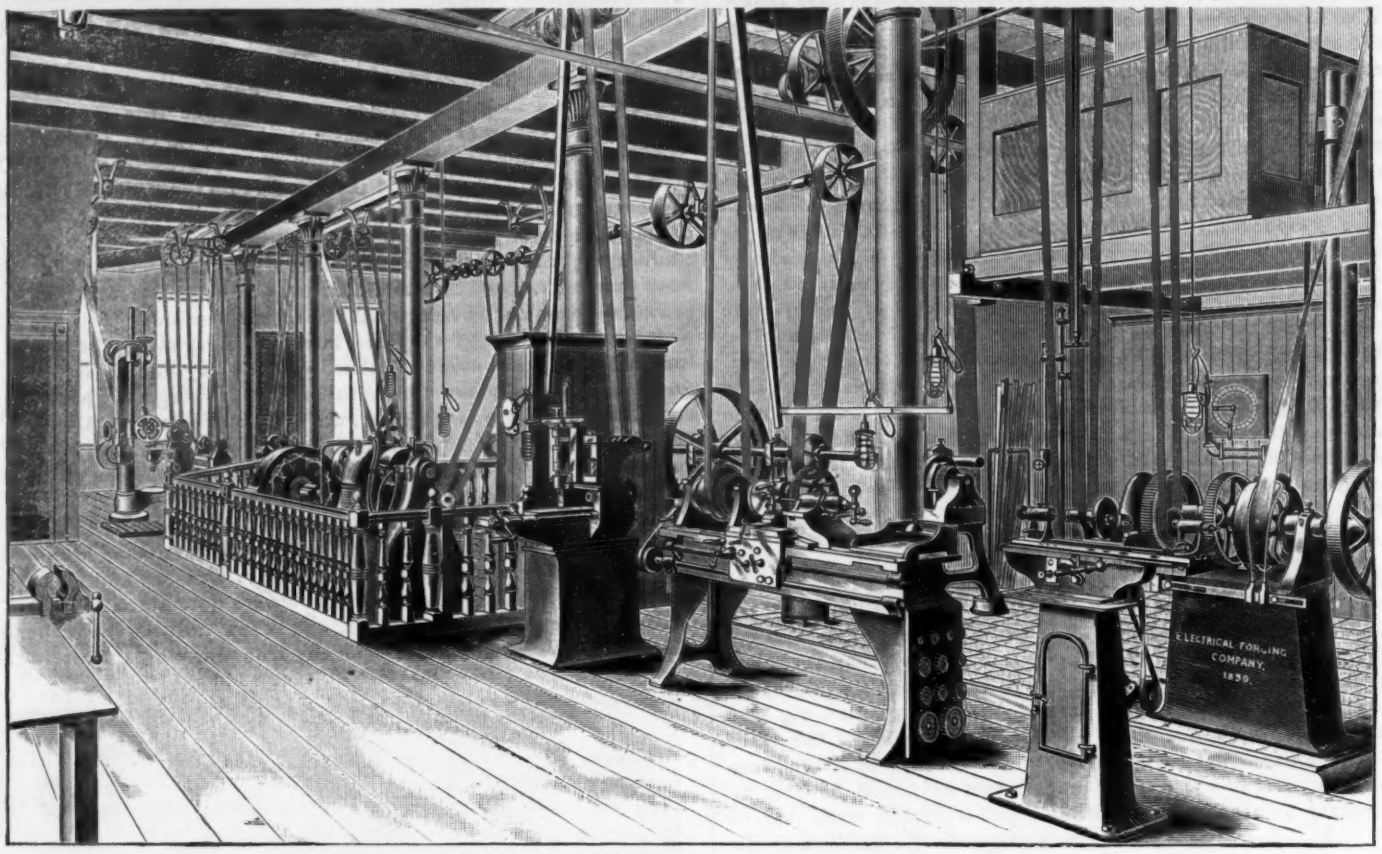


FIG. 1.—GENERATING ROOM, BURTON ELECTRIC FORGING WORKS.

intermittent current is used according to the class of machine and nature of the work to be done.

Fig. 1 is a general view of the generating-room on the first floor of building, and shows also one of the converters and a number of special machines for shaping the metal after heating. It should be stated here that from the first alternating currents have been used in conjunction with large converters capable of developing enormous amperage. The generating plant, proper, is contained within the portion of the building surrounded by a railing, as shown in the drawing, and consists, first, of a 60 horse-power Thomson-Houston motor, which receives its current from the regular street circuits of the Edison Illuminating Co., of Boston. This motor is belted to a line of shafting carrying one Emerson power scale with meter attachments for accurate measurement of horse-power consumed. From this line of shafting is driven a 60 horse-power alternating generator and also a small exciting ma-

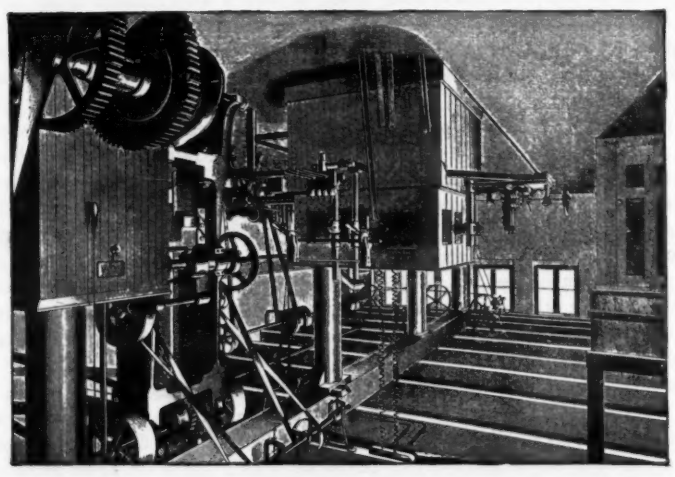


FIG. 3.—CONVERTER IN BASEMENT.

chine for the fields of the generator, as shown in Fig. 1. This main shaft also drives the main line of shafting shown at the top of Fig. 1 which operates all the tools and forging machines both on this floor and in the basement below. The generator is specially wound to develop 24 amperes at 1,500 volts, and the current is controlled by a two-way switch, which throws it either into the converter shown in the upper right-hand corner of Fig. 1 and in detail in Fig. 2, or into the converter in the basement as shown in Fig. 3.

The converter has a capacity of 60 h. p., and is designed to deliver current at 5 volts and from 5,000 to 8,000 amperes. From the rings above described, this enormous current is conducted by three sets of heavy copper bars, (as shown in detail in Fig. 2) to special electrodes provided with automatic adjustable clamps, in which the heating of the metals takes place. These electrodes are, as shown in Fig. 1, conveniently situated amongst machines for rolling balls, rivets and other kinds of regular and irregular shapes, the metal being heated and then passed into the machine. The electrodes shown in Fig. 2 are of special design, and vary according to the kind of work to be done. In certain cases where end heat is required, the clamps on the electrodes of one

polarity are provided with a number of holes, through which a number of metal rods can be inserted, as shown in the figure. When these rods come into contact with the electrode of clamp or the other polarity, they are heated in a few seconds to a forging heat, and while one heated rod is being worked by the rolling machines, the other rods are in the process of being heated, the machines being thus fed with a constant supply of heated metal. The capacity of this converter is about 1¼ inch steel, round or square, and four bars of this size can easily be heated at the same time. A complete outfit, however, has recently been shipped to England, and another to Canada, which will heat a bar up to 5 inches square and 3 feet long, throughout its entire length in about five minutes, with an expenditure of from 75 to 100 horse-power.

Some of the things that have been done by the Burton process will indicate its efficiency:

A round bar of tool steel, ⅞ inch diameter and 11 inches long between the clamps, is raised to the proper forging heat in one minute by 32 h. p.

A flat bar of machinery steel, ¼ inch thick, 1 inch wide and 17 inches long, is heated in one minute by 34 h. p.

Balling stocks for balls, tool steel ½ inch diameter and 5 inches distance between the clamps, is heated in half a minute by 27¼ h. p. This heat can be

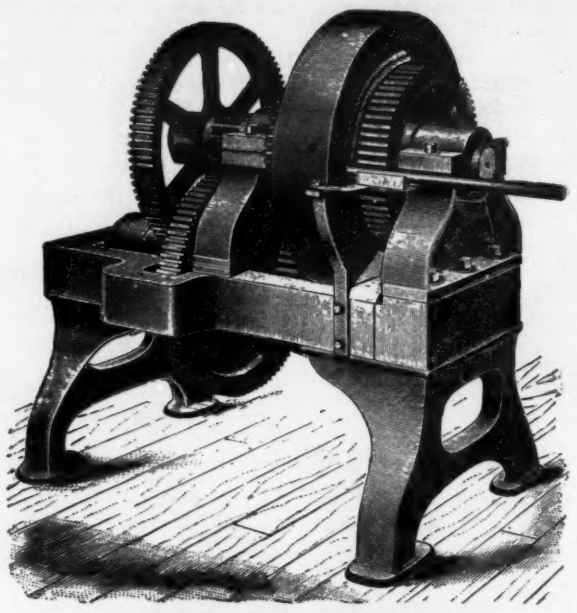


FIG. 4.—BURTON ELECTRIC ROLLING MACHINE.

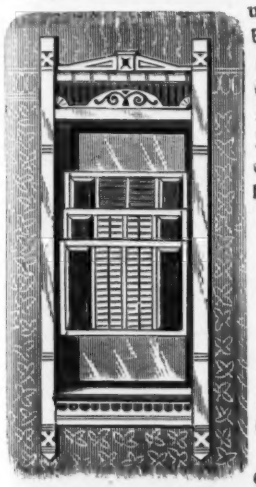
maintained for any length of time, by means of a perfect controlling apparatus, the heat on the metal during that time remaining perfectly constant.

A bar of machinery steel 1 inch square and 12 inches long is brought to a white heat in 2½ minutes by 36 h. p.

Among the claims for the Burton process, is, first, the economy of space, no provision having to be made for large furnaces, and consequently more room can be allotted to the metal-working machines. Then there is great economy in the fuel, as the fuel, instead of being scattered in a number of different forges, is concentrated in one boiler furnace. There are also no ashes to be withdrawn from forges, nor fuel to be brought to them, thereby affecting a large saving in time and labor. The simplicity of the machine is another factor in its favor, it being extremely easy to operate and under perfect control, and after a few pieces of metal of certain size have been heated, the machines can be set to act perfectly automatically and without any skilled assistance.

THE HARTMAN SLIDING BLINDS.

Architects, contractors and builders will be interested in the accompanying illustration of a new inside sliding blind which is rapidly becoming a feature in modern buildings, public and private. The



Hartman patent inside sliding window blinds are manufactured by the Hartman Sliding Blind Co., of Wooster, O. They are made to slide up and down in the window the same as sash, and remain in whatever position they are placed. They are counterbalanced with weights or springs, and work freely and smoothly. By the use of these blinds light can be obscured, modulated, or obtained in any part of the room, and ventilation directed, making either a high, low or medium current. This company has been making these blinds for the past five years, and the orders have been constantly increasing year by year, until it has become necessary, recently, to locate in a new and commodious factory, fitted with all the latest new and improved machinery. They have also established branch factories in the United States and Canada to meet the increasing demands for their product. At the factory at Wooster, O., in one period of 15 days, recently, orders amounting to $3,500 were received. The 80-page illustrated catalogue of the company is mailed to any one sending them four cents in stamps. The Hartman Sliding Blind Co. will give prompt attention to all inquiries.

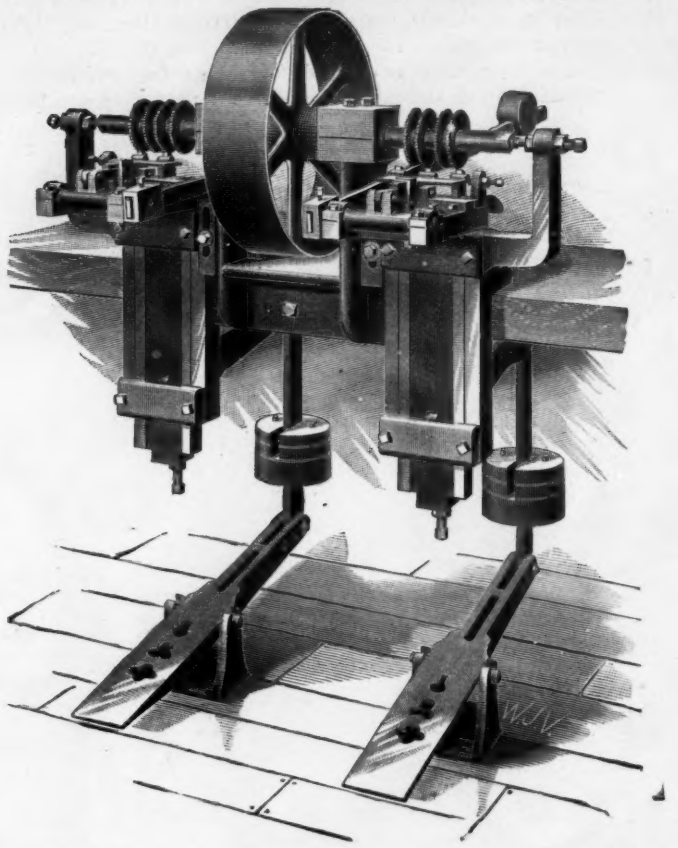
AN ingenious method of testing the hardness of steel has been invented by a Swedish metallurgist. It is based upon the intensity of current necessary to fuse a wire of a standard size. By experiment the current required to fuse standard wires of different degrees of hardness can be determined and upon this basis the quality of any sample can be ascertained.

THE ADT DOUBLE BUTT MILLING MACHINE.

The machine shown in the accompanying cut is for milling the joints of all kinds of cast door butts, and is designed to be attached to an ordinary bench. A gang of mills is mounted at each end of a horizontal steel shaft which is run from one pulley in the center.

The tables on which the work is fed up to the mills are provided with adjustable, self-opening and closing chucks which hold the work while being milled, and when the tables are lowered, automatically releases the work, admitting the operator to take out the piece and insert another, and as the table is again fed towards the mills the chuck closses upon the work auto matically, holding it securely. The table is lowered by a pressure of the foot to the treadle, and by raising the foot from the treadle, the table is fed towards the mills by means of a series of weights.

One operator can with ease run one of these double machines, and by matching the halves of the butts during the milling process, any slight variation in the parts can be detected; this is the only method by which accurate work can be assured. Where a single machine is used for both parts, especially on large lots, the mill may become dull before the first halves are finished, which will cause a variation in size, and by the time the second halves are finished there will be so much difference in the two parts that some of them will not match; it will then be necessary to mill them over again or fit



them by hand. In using a double machine and milling both parts at once, not only is much time saved in changing mills, but the buts are matched ready to commence drilling at once, and thus the two operations can be carried on together without the delay of waiting for the second half to be finished.

An illustration and description of an improved butt drilling machine designed to be used in connection with the double butt milling machine was recently given in this paper, and the manufacturers, John Adt & Son, New Haven, Conn., will be pleased to mail full particulars and prices of both machines to any one interested.

New Iron Clad Destroyer.

General Gordon's design for a new ironclad destroyer is under consideration by the Naval Committee of the House of Representatives at Washington. The vessel is to be 260 feet in length by 40 feet in breadth and 16 feet draft, giving a displacement of 2,400 tons, with a speed of 20 knots an hour. The vessel in size will be larger than the Yorktown and smaller than the Charleston. The feature of the design is found in an enormous submarine gun carried at the bow, below the water line, and a hydraulic buffer projects from the bows. This is so adjusted that it will stop the boat at a distance of 8 feet from the enemy's ship, without injury to the boat. At this short range the buffer automatically discharges the submarine gun directly at the hull of the ship, and lodges within it a shell carrying a bursting charge of 450 pounds of powder, sufficient to blow down every bulkhead in the ship and wreck the bottom. The details of the boat, it is said, have been carefully worked out, and the calculations have been verified by experts.

British Ship Building in 1891.

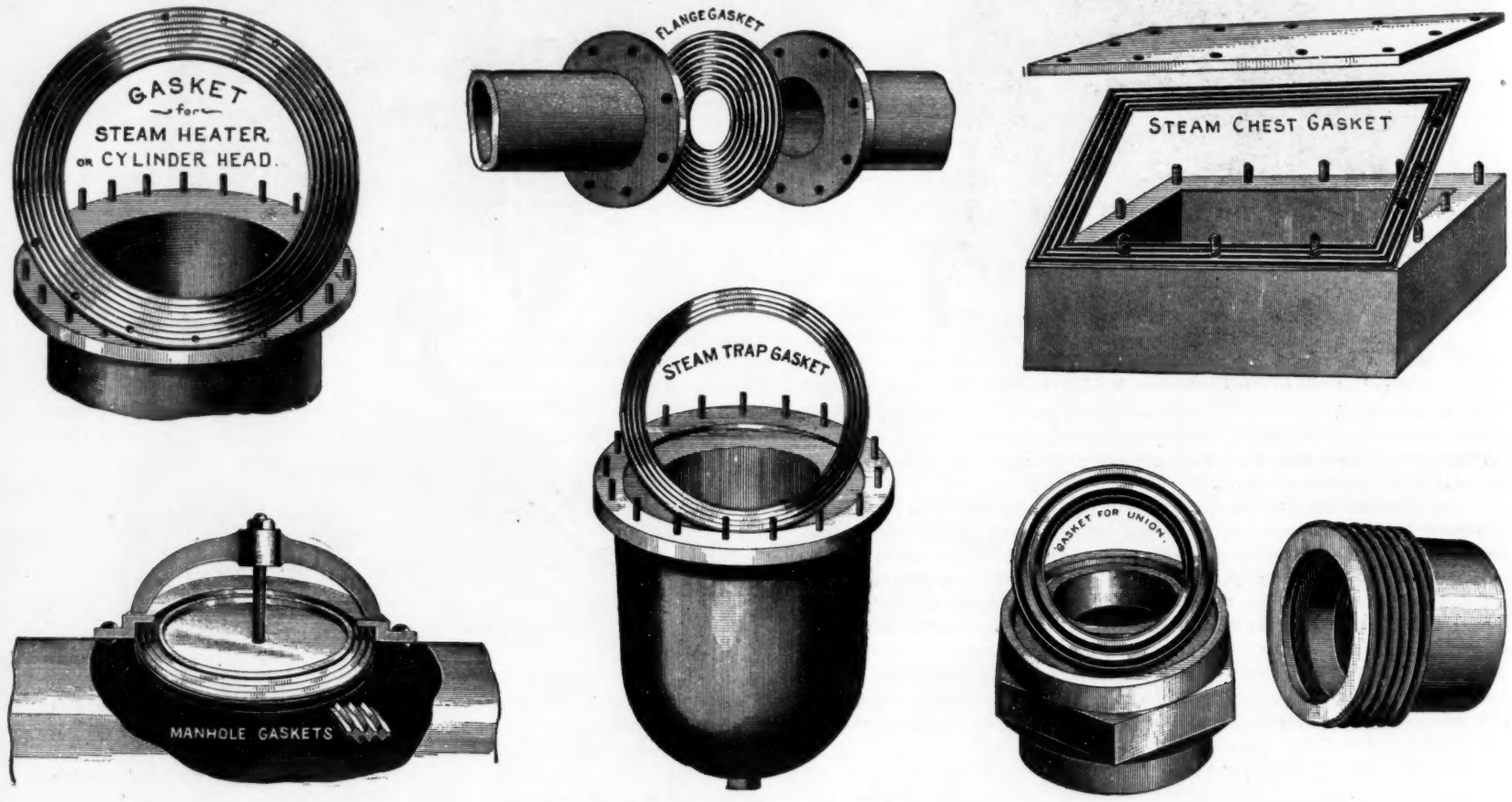
British ship-building during the year 1891 made a total output of 1,142,000 tons, all of steel and iron, of which 927,000 tons were steamers. Allowing for sales of tonnage and losses, the net increase for the year of British tonnage is 502,000 tons steamers and 30,000 tons sailers. The conspicuous feature is the increasing size of cargo steamers, commonly called tramps, vessels carrying 6,000 to 7,000 tons being numerous. Aside from two of extraordinary size and speed for the American trade, few large liners were built, and there is little contract work in progress, although dividends were better than during the previous year. Few steamers are now lying up.

GUILLOTT'S METALLIC GASKETS.

The careful engineer appreciates the importance of good gaskets for making joints in pipes that hold steam, water or gas under pressure. Tight joints are the end to be attained, and in choosing his gaskets the engineer will have a care also to get those that promise to be longest-lived. The metal gaskets illustrated on this page, manufactured by Guillott's Automatic Metal Gasket Co., of 65 S. Canal street, Chicago, Ill., are commended as particularly suitable and reliable, for making perfect joints in steam boilers, steam pipes, mud drums, traps, flange joints, unions, cylinder heads, steam chests, and in steam hammers, heaters, both steam and hot water, in lard and varnish tanks and hydraulic machinery of all kinds.

These gaskets are made of pure metal and different kinds of prepared composition, which is put through a certain process that has the effect of tempering the gaskets, making them capable of standing the highest pressure and remaining tight under all conditions of ordinary practice. Neither do they become softened by heat, so that the pressure effects them injuriously, causing leaks, for they remain tight under all conditions, and this without losing elasticity, for they will remain pliable for any length of time and reliable in all places, no matter how great the temperature, as they stand, without injury, an extremely high degree of heat.

The Guillott gaskets are suitable for every purpose about a steam plant, and it is most desirable to have all joints packed with the same material when it is equally reliable for the various purposes. The man hole gaskets are shown in one of the accompanying cuts. An important advantage in their use is that when applying them, nothing else is required, as they hang tight to the plate and do not become attached to the boiler, and as they do not corrode, they may be used as many times as desired, for their deterioration is not perceptible and it is only by an accident or willfulness that they will be torn or



GUILLOTT'S METALLIC GASKETS.

otherwise rendered unserviceable. The man-hole gaskets are made of various sizes to fit any plate. The gaskets for flanged joints, which are also shown, are of correct form and made in all sizes and thickness, and have been found highly satisfactory wherever used. The thickest gaskets have never given any trouble by blowing out, even where very high pressure has been carried. Gaskets for such joints are made either with holes for bolts, or to lay inside of the bolts, they being equally serviceable when used in either way.

The steam-chest gasket has the same advantage as the others and is made wide to cover the whole surface and has holes for bolts, or narrower, being then designed to go wholly inside the bolts. Either kind is furnished as required, some engineers prefering the narrow style, while others insist on having a gasket the full width of a joint. Gaskets for unions, as illustrated herewith, are applicable to all kinds of union joints, no matter what the substance to be retained. They are found especially reliable for this purpose, as the use to which they are subjected has no tendency to destroy them. The illustrations also include the Guillott gasket for steam trap and for steam heater or cylinder head—both well adapted to these purposes.

All these gaskets are furnished with a guarantee that they will give practically perfect results. To introduce them and demonstrate their qualities, they are sometimes sent out on trial to responsible parties, and if at any time, they do not prove desirable, the manufacturers replace them free of charge, although this has not yet been required, as no failure has been reported. A large trade has been already built up throughout the United States, and included among its customers are some of the largest oil companies, steel and iron manufacturers, electric light plants, railroads, gas companies, water works, cable stations, etc., and the constant and ever increasing demand goes to show that the goods are all that are claimed for them.

LAKE SUPERIOR MINING NOTES.

W. F. Mattes, President of the Superior, Wisconsin, Iron & Steel Co., says of the Mesaba: "While there will undoubtedly be many good mines developed on the range, and a few great ones, yet investors must be on their guard and not go blindly into every property offered just because it is in the Mesaba country. The range is limited in width and in some portions is barren. Some of the properties now on the market are worse than worthless."

State Geologist Winchell believes that Mesaba will ship 200,000 tons of ore this year. He says it showed twice as much ore in four months' work as the Gogebic, after four months: "I do not believe that all these ores, any more than of the Gogebic, will come to the Bessemer limit, but I do believe that all ores will be produced in greater quantity than from the Gogebic mines."

This dispatch to the daily papers, from Ashland, Wis., is printed for what it is worth. "A number of prominent mining speculators, who have been dabbling in Mesaba stocks at Duluth, have arrived here. It is intimated that they have secured options on the Metersembria range and will try to turn the tide to the properties. It is said that they represent a number of Eastern syndicates. The outlook for the Gogebic range for the coming season is that the ore produced will be largely increased. It is stated that the Lake Shore alone will handle over 500,000 tons more than last year at Ashland. An effort is again to be made to consolidate nearly all the properties on the range into one or two companies."

A Norway, Mich., dispatch says that the town has gradually out grown the effects of the fire of 1888, and that there is now more exploring work being done in its vicinity than at any other point on the Menominee. "On the north range, two and a half miles from the city, Wheeler Bros. & Co. have run a line of four pits covering a distance of more than 200 feet on the southwest ¼ of section 30, 40 29 and a shaft to a greater depth on section 25, 40-30, adjoining, which is being put down by the Finlay Mining Co., showing another rich spot in the new range. The ore on section 30 is a soft hematite of a Bessemer grade and lies near enough to the surface to make stripping and open-pit work both feasible and economical. The mines tributary to Norway are at present employing more men than those in the vicinity of Iron Mountain."

It is settled that Lake Angeline is to be pumped out. Ishpeming, (Mich.) *Iron Ore* says that a contract for the work has been made with B. C. Howell, of New York. A centrifugal pump having a 20-inch suction and 22-inch discharge will be mounted on a scow and a crib will have to be constructed. The Cleveland, Lake Superior and Lake Angeline companies, all of which have ore beneath the lake, will be at enormous expense in the work. It is thought five months will be required to finish it. The lake covers an area of 153 acres. Its maximum depth is 43 feet and the mean depth is 20 feet. There are 800,000,000 gallons to be lifted, to say nothing of the inflow that will take place from the numerous springs, while the pumping is in progress.

A Republic, Mich., correspondent, responding to a statement in an Ishpeming paper, about his town, says: "The facts of the matter are that between 700 and 800 men are employed in and around the Republic mine instead of 250, and only about 70 unmarried men have been laid off. Business men report trade a little slack, but that is to be expected at this time of the year. Republic is unlike other cities that are up one day and down the next. It is always on a solid foundation."

Duncan Gilchrist, an old Ishpeming resident, is superintending the insertion of a new hoisting plant for the Hamilton shaft at Iron Mountain. Mr. Gilchrist is now employed by the well-known mining machinery manufacturers, Webster, Camp & Lane, of Akron, O.—[Lake Superior Democart, Ishpeming.

TRANSMITTED POWER FOR MINING OPERATIONS.

The utilization of sources of power remote from its point of application has, during the past two years, received considerable attention from electricians in this and other countries; and repeated experiments have demonstrated the practicability of utilizing power, by the adoption of electrical methods, which would otherwise be wasted, and of its utilization to such advantages that projects may be, and have been, carried out which, without the application of electricity, would have been impossible. This has been particularly the case in the mining industry. Loads of metal are frequentiy found at great altitudes, where, unless some cheap power can be applied at the required spot, they can never repay working. It is not so long ago that a project to generate power for mining purposes at the foot of a mountain and utilize it economically midway, or at the summit, would have been scoffed at as visionary; but this feat has been acomplished and with complete success.

Probably the best example of this, at the present time, is the large plant which has been installed by the Edison General Electric Co., at the Virginius group of mines near Ouray, Colorado. It is one of the largest, if not the largest, purely mining plant in the world. Every difficulty likely to be met with in work of this nature was encountered in the installation. The pipe line is laid along the side of a rocky canon; the wires from the power house to the mine are strung partly through dense timber, where they are exposed to damage from falling trees, and partly above timber line, over rocks and snow banks, where the poles and wires are liable to be carried away by snow-slides and where lightning storms are frequent and violent. The line is nearly four miles long, the voltage of the current 800 volts, and the mine is wet. The relative advantages of the ground return and complete metallic circuit are illustrated, and switches are so arranged that either may be employed, the metallic circuit being used at present. The plant includes a variety of machinery, comprising two pumps, one hoist, one blower, and two motors running mills, indeed, almost everything except locomotives and drills, and those will probably be added shortly. Lastly, the enormous saving that can be effected in many places by the utilization and transmission of water power by means of electricity is strikingly manifested. Coal at the mines costs $18 per ton, and before the installation of this plant was made, the cost of the power amounted to nearly $40,000 per annum. This sum is saved by the adoption of electric power. An instance is also afforded of unprofitable mines being rendered profitable by the use of cheaper power, for while some of the mines in this group are rich enough in metal to repay working under the most adverse conditions, there are others of lower grade which would have been shut down in case the electric plant had proved a failure, but which, with the plant, will now yield a satisfactory profit.

The foregoing gives a general idea of the nature of the plant and the difficulties encountered in its installation, but an actual visit to the mine is necessary to give a correct conception of the real character of the plant, which is undoubtedly one of the most remarkable in existence. Great credit is reflected on the managers of the mine, who possessed the requisite enterprise and sagacity to expend a large amount of money on a purely speculative experiment, the success of which was regarded as uncertain by even the strongest advocates of electric transmission of power.

If a careful search of the Rocky Mountain Region had been made, with a view of selecting for the first extensive experimental mining plant a location presenting every conceivable difficulty and one which would prove a crucial test to electric power at the very outset, it is very propable that the Virginius mine would have been chosen.

The Virginius and neighboring mines, owned by the Caroline Mining Co., are situated near the summit of Mt. Snoffles, in the region of perpetual snow at an altitude of 12,700 feet above the sea and about 5,000 feet higher than timber line. They are reached by a wagon road, open in the Summer, but impassible in the Winter, when the only route to the mines is by a difficult trail, the lower part of which, denominated the "zig-zag," winds up an acclivity so precipitous that burros with their packs slipping from the train frequently roll down past several branches of the zig-zag before they are stopped by a tree or rock. The upper part extends over a rocky plateau above timber line, and along cliffs where the snow is frequently over 20 feet deep on the level, and where terrific wind and lightning storms are frequent. The lower half of the line from the power house to the foot of the zig-zag extends up a deep canon through a forest of dense timber. The danger of breakage and grounds from falling trees which are frequently blown down by storms and rest on the wires for some time before they can be removed, is continually present. The construction of heavy line work over nearly four miles of such ground is an undertaking, the difficulty of which is evident, but which can be fully appreciated only by an actual examination; while the maintenance and operation of the plant under the conditions just specified present even more serious difficulties. But although these difficulties are exceptionally great, the enormous expense of transporting fuel to the mines rendered the advantages of an electric transmission plant so very striking that the management was induced to make the trial.

The water power utilized for the plant is in Red Canon Creek, nearly four miles from the mines. The water power plant consists of a small dam, an iron pipe line, extending along the side of the canon, a distance of about 4,000 feet, giving an effective head of 485 feet, and two Pelton wheels, one five feet, the other six feet in diameter, capable of developing under that head 500 horse-power and 720 horse-power, respectively, or a total of 1,220 horse-power, the two wheels being connected to separate shafts, so that either wheel may run the entire station. The electric generating plant comprises at present one 100 k. w. Edison dynamo and two 60 k. w. Edison dynamos, giving a total output of 293 electric horse-power. The length of the line, as previously described, is a little over 19,000 feet. The electric machinery operated at the mines consists at present of two pumps, 60 horse-power and 25 horse-power, respecti ly; one hoist, 25 horse-power; two Edison motors, each of 60 horse-power, running concentrators and stamping mills and a 15 horse-power blower. The large pump, which was erected when the plant was first installed, raises 150 gallons of water, 700 feet per minute, and is of the Knowles duplex type. An Edison standard motor is geared to it by a double worm, one right hand and one left hand, working into two spur-gears that mesh into each other and operate the pump, the object of the two worms being to neutralize the longitudinal thrust. The smaller pump, which was installed a few months ago, is somewhat similar, the motor, however, being mounted over the pump, with its armature vertical, the weight of the armature counteracting the thrust of the single worm employed. Both pumps have been working steadily and smoothly for several months, and have satisfactorily filled requirements.

The hoist consists of an Edison motor of standard type, but of street car winding and controlling switch, geared to the drum through the medium of a friction clutch. By means of the controlling switch and clutch, the hoist is under more perfect control than a steam hoist.

The motors for the mills and blowers are of the standard type, and present no exceptional features.

The most serious troubles have been caused by lightning—electric storms in that section of the country being frequent and very violent. This has formed the subject matter of particular study, and special lightning arresters have been devised that give excellent protection. Since their adoption little or no trouble has been experienced from this source.

That difficulties were encountered in the early operation of the plant is not surprising, and the fact that these difficulties have been overcome, and the entire plant is operated successfully and satisfactorily under conditions that for severity are not likely to be exceeded anywhere, demonstrates the practicability of electric power for mining and guarantees its success in this field.

Newport Rolling Mill Co.'s Improvements.

The announcement was made in this paper, some months ago, that Wilson F. Gaff, A. L. Andrews, J. A. Andrews and others had purchased what for 44 years had been known as the Swift Rolling Mill & Iron & Steel Co. property, having some ten acres of land, and a long frontage on Licking river, in Newport, Ky. The property included a blast furnace, having large output, and all the needed buildings and machinery for carrying on the business successfully.

In all the years that the original owners of the property had operated it, more than half a million dollars had been put into the plant, and for many of the 44 years there had been besides a good profit. The new company secured the property at about one-seventh its cost, but they could not now secure so excellent a location, with its water front and erect buildings and equip them with the needed machinery, for even the amount that the plant represented to the old company. The saving over the cost of a new site and plant is thus equivalent to several hundred thousand dollars of working capital.

From the time the new company started up, in July, 1891, to January 1, 1892, they did a good business, and considering the somewhat dull condition of trade in the country last year their sales of sheet iron and steel were very heavy. For some weeks early in the year their mill was shut down, in part, to make some repairs, and to put in some new machinery consisting of steel sheet mills, for rolling light steel sheets, and new hot shears for cutting sheet bars direct from the muck mill. These improvements, which are now completed, have greatly increased their facilities and will add to their output of sheet iron and steel very materially.

The company is now in good shape to handle the Spring trade, and with tracks from two railroads running into their yards they can make prompt shipments of car lots, saving both time and expense in handling. One customer alone will use some 50,000 tons of the output of the Newport Rolling Mill Co. this year, for iron roofing, aside from sheet steel for steel roofing. Others will take a large part of the output for the same purpose, and still leave a goodly portion to meet the demands of the general trade. Consumers of sheet iron or sheet steel may place their orders with the Newport Rolling Mill Co. in the confidence that they will be carefully filled. Repeated orders from the same source are an evidence of prosperity based on merit.

Engineers' Tests for Iron.

At the meeting of the Liverpool Engineering Society, held on February 10, Mr. Thomas Morris read a paper on "Engineers' Tests for Iron considered, and Suggestions for Standard Uniform Tests." The author showed by tables of numerous engineers' tests how engineers would ask for different tensile strains for same class of work, adding that the iron must be equal to some known "brand," as though the iron produced in the localities named were uniform in quality. He paid a high tribute to the reduction of area test, as being one that gave more consolation to the engineer in case of work coming to grief than any other test specified. The elongation test, which he said was only another form of test for ductility, was not to be depended upon with the same ease and comfort as contraction of area; and the manner in which the former test was specified by nearly all engineers was anything but creditable. He treated the limit of elasticity test with disfavor. His suggestions for standard uniform tests and conditions were put in the simplest form, and were thoroughly explained to those present. The paper was very well received by the large number of members present, and the discussion was adjourned to the next meeting.—[Iron and Coal Trades Review, London.

WITHIN a month, the shipbuilding firm of William Cramp & Sons will have completed the only plant in the country capable of building, equipping, fitting out and arming war vessels. The capacity of the gun factory now in course of construction will be ten pieces of ordnance a month, ranging in caliber from one to five inches. Projectiles will also be manufactured.

THE J. D. Smith Foundry Supply Co., of Cincinnati, send us a v y neat combination calendar and pen-wiper that, apart from its utility, is a novel esk ornament.

INDUSTRIAL SUMMARY.

New Enterprises :—

The following recent incorporations, specially reported for *The Iron Trade Review*, are of interest to the iron and machinery trade :

Chicago, Ill.—Devine Boiler Works ; capital, $20,000 ; for the manufacture of steam and hot water boilers ; incorporators : Wells B. Sizer, W. L. Hinds, Daniel W. Blish.

Chicago, Ill.—Aurora Iron Works ; capital, $15,000 ; to manufacture and deal in products of wood and metals ; incorporators : Benj. F. Disborn, Chas. A. Neff, Ira J. Geer.

Detroit, Mich.—Trousers Stretchers Co.; capital, $20,000 ; for the manufacture and sale of trousers stretchers ; incorporators : Geo. S. MacDonald, Chas. Martin, F. B. Wemple, all of Detroit, Mich.

Aurora, Ill.—Aurora Wire Goods & Manufacturing Co.; capital, $25,000 ; for the manufacture of wire goods and other articles ; incorporators : J. O. Curry, E. W. Hall, C. A. Van Velzer, D. A. Wedmore.

Allentown, Pa.—Blue Ridge Powder Co.; capital, $15,000 ; for the purpose of manufacturing dynamite and powder, and to sell the same ; incorporators : W. H. Deshler, Jas. H. Pascoe, Jas. Webb, all of Allentown, Pa.

Columbus, O.—The M. E. Schrock Co.; capital, $25,000 ; for manufacturing and dealing in farming implements, vehicles, etc.; incorporators : M. E. Schrock, C. P. Mitchell, J. B. McDonald, W. B. Bolton, S. G. Leonard.

Easton, Pa.—The Pennsylvania Hard Vein Slate Co.; capital, $25,000 ; for mining, quarrying, manufacturing and selling slate and slate products ; incorporators : Geo. W. Geiser, Birge Pearson, Jas. Young, all of Easton, Pa.

Chicago, Ill.—Wilcox Anti-Friction Journal Co.; capital, $200,000 ; to manufacture and sell journal boxes for all kinds of cars, and all other journal bearings ; incorporators : Charles Fellowes, John C. Polley, Jr., James W. Morgan.

Lockport, Ill.—Barrows Lock Co.; capital, $25,000 ; to manufacture, buy, sell and deal in builders' hardware and do a general manufacturing and commercial business ; incorporators : Hiram N. Sager, Morris M. Herriman, Adolph Vieser.

Wellington, O —The Wenger Animal Dipping Machine Co.; capital, $40,000 ; for manufacturing and selling the Wenger animal dipping machine and an animal dip or wash, etc.; incorporators : Jacob E. Wenger, D. L. Wadsworth, F. W. Bennett, S. Windecker, S. K. Laundon, A. B. Lambert.

Chicago, Ill.—Siemens & Halske Electric Co. of America ; capital, $500,000 ; to manufacture, purchase, sell or use electrical devices and appliances and apparatus, acquire patents or other property, etc., relating to said business, etc ; incorporators : C. W. Maysenburg, Edwin F. Bayley, Otis H. Waldo.

Williamsport, Pa.—Rowley & Hermance Co.; capital, $325,000 ; for the purpose of manufacturing iron or steel or both, or of any other metal or of any article of commerce from metal or wood or both ; incorporators : Edwin A. Rowley, Albert D. Hermance, both of Williamsport, Pa.; Caleb S. Clumm, Philadelphia, Pa.

Chicago, Ill.—Russell Self Closing & Locking Elevator Door Co.; capital, $50,000 ; to manufacture, erect, supply and sell the Russell self closing and locking elevator doors, under patents issued to or that may be issued to Bert M Russell, of Chicago, Ill.; incorporators : Bert. M. Russell, John M. Russell, Richard Robins.

OTHER NEW ENTERPRISES.

It is reported that the Ford Boiler Cleaner Co., of Norristown, Pa., will establish a plant at that point.

J. H. Cole & Co., of Parkersburg, W. Va., will establish a foundry and machine shop at Bridgeport, Ala.

There is talk of the establishment of a plant at Kingston, Mass., for the manufacture of the Holmes graphite fiber, a patent compound for machinery bearings.

The Corning Steel Co. have signed contracts to establish their plant at Hammond, Ill. The company are capitalized at $1,000,000, and will erect works costing $300,000.

The Comins Manufacturing Co. have been organized at Columbus, O., with a cash capital of $25,000. The company will occupy the old Stevenson foundry, and engage in the manufacture of engines and boilers, and other mechanical appliances.

A new corporation, known as the Finch Manufacturing Co., and composed of local capitalists, have made arrangements to purchase the plant of I. A Finch & Co., at Scranton, Pa. The new concern has a capital stock of $400,000. The foundry plant, which now embraces a tract 450x250 feet, will be considerably enlarged and improved.

The negotiations for the purchase of the Iron City Manufacturing Co.'s plant, in Pittsburgh, have been completed, and in the future the concern will be know as the Pittsburgh Car Company. The new company is composed of Buffalo and local capitalists who will manufacture car wheels exclusively. For the present the Pittsburgh works will be considered as a branch of the Buffalo Car Wheel Co.

News of New Corporations :—

Inquiries sent by *The Iron Trade Review* have brought out the facts noted below, concerning companies recently incorporated for manufacturing purposes. Our advertisers and readers will find it to their advantage to watch this column. These paragraphs represent just so many opportunities for new business :

Ajax Iron Works Co., of Corry, Pa., succeeds the firm of same name and have the latter's plant.

The Anderson Knife & Bar Co., of Anderson, Ind., are ready to fill orders for machine knives of every description and fly bars and bed plates for paper mills.

The Aurora Tool Works is the new corporate name of the John N. Sargent Manufacturing Co., of Aurora, Ind. They will continue to make the manufacture of drill presses a specialty.

The Illinois Bath Tub Co., recently incorporated, bought the Western factory at Pennock, Ill., of F. H. Holton & Co., of Boston. The plant is in full operation. Office, 220 La Salle street, Chicago.

The Maltby & Wallace Co., recently incorporated, succeed to the business and plant established six years ago at Champaign, Ill., by Maltby & Wallace. Their specialty is the "Success" hot water heater.

The American Stamping Co., office 42 Water street, New York, has its factory in Brooklyn, E. D. Buildings are 122x225. The company make stamped, pieced, japanned and tin ware and galvanized iron ware.

The J. W. Hewitt Manufacturing Co., of Kendallville, Ind., will manufacture buggies, road and business wagons, carts and Hewitt's patent combination sulky and speed cart. They will need elevators and heating apparatus.

The Tension Wheel Co. recently incorporated in Illinois, will manufacture iron and steel wheels. Their office is at 593 La Salle avenue. As yet plans for plant are not perfected, but it is the expectation to fill orders within 90 days.

The Leverick Manufacturing Co., of Geneva, N. Y., are putting up a factory 35x80. Will want boiler, engine, belting, pulleys, drills, shafting and heating apparatus. Expect to fill orders in six weeks, for furniture specialties and washing machines.

Osborne Manufacturing Co., office 18 Huron street, Cleveland, was recently incorporated, to enlarge the business heretofore carried on under a firm name. They make steel wire brushes and brooms for factories and foundries, steel wire horse brushes, flue scrapers, etc.

The Elevator Safety Floor Co., office 45 E. Congress street, Detroit, Mich., will make safety and fire proof floors for elevator shafts. Accidents by falling down elevator shafts are prevented by the use of their flooring, and draughts are stopped, in case of fire. Ready to fill orders.

Novelties in turned and sawed wood will be manufactured by the Wooden Novelty Co., of Coshocton, O. Their two-story building 47x55, will be up by May 1, and they will begin to fill orders May 15. They will use 400 feet of belting, and will want wood lathes, pulleys, shafting and iron roofing.

The Chicago Steel Casting Co., office No. 36 La Salle street, Chicago, Ill., will manufacture open-hearth and crucible steel castings. Their building is at 48th and Green streets, 100x100 feet, and is almost in running order. They are now building furnaces and will be ready to fill orders about May 1.

The Penn Steel Casting & Machine Co., of Chester, Pa., are to make open-hearth steel castings, and if desired, will do the machine work on the same. They will at once put up a building 235x120, and will need boiler of 100 h. p., engine of 70 h. p., two cold-cutting saws (42″ and 30″) and two shapers.

The Chillicothe Manufacturing Co., of Chillicothe, O., will manufacture coffee mills, door-holders, cash registers, rat traps, wagon jacks, etc. Their buildings are of brick, two stories high and 40x80. Their boilers are 42x12, and engine of 25 h. p. On some articles they will be ready to fill orders March 28.

The Ohio Wagon Co., which was an incorporation under the laws of Ohio, located in Cincinnati, has recently organized under the laws of Indiana, having moved its plant to Muncie. A building 250x50, of iron and wood, is already up and the plant is in running order. They will make undertakers' wagons and ambulances.

The Peoria Iron & Steel Co., of Peoria, Ill., are erecting brick buildings, 200x83, and 253x119, that will be completed May 1. They will have 15 boilers and three engines, of 800 h. p. Their machinery is nearly all up and they are now working on the furnaces. Roofs will be of iron and asbestos. Their product will be iron and steel specialties, belts and merchant iron. Ready for orders May 15.

The Decatur Steel Roofing & Corrugating Co., of Decatur, Ill., will be ready by March 20, to fill orders for the Jones & Bonebrake patent steel roofing, Bonebrakes' patent slip joint eave trough, corrugated iron sidings, ceilings, etc. Their buildings, 50x112, are nearly all new. They have orders ahead for their goods and with abundance of capital expect to equal any establishment of the kind.

The Dayton Steam Boiler Co., recently incorporated, succeed the firm of Graves & Marshall, who, by purchase in 1888, succeeded E. H. Brownell & Co. and the Dayton Steam Boiler Works. The company intend to continue the business at the old stand in Dayton, O. Their shops are frame, except the sheet iron department, which is of brick. They have a frontage of 112 feet on First street and 228 on Foundry street. They have a private track connecting them with the P. C. & St. L., C. C. C. & St. L., C. H. & D., D. & U. and D. & I. roads. They are thoroughly equipped and ready for business.

Additions, Enlargements, Removals, Etc.:—

John Bringhurst is enlarging his rolling mill at Marshallton, Del.

The Sterling Steel Co., McKeesport, Pa., is expending $65,000 on additional shops.

The machine shop of the Jackson Shell Roll Co., Pawtucket, R. I., is to be enlarged.

The Wisconsin Central Railroad Co. will enlarge its car shops at Stevens Point, Wis., this year.

The Allegheny Railroad Co. will enlarge one of its machine shops at Verona, Pa., this Summer.

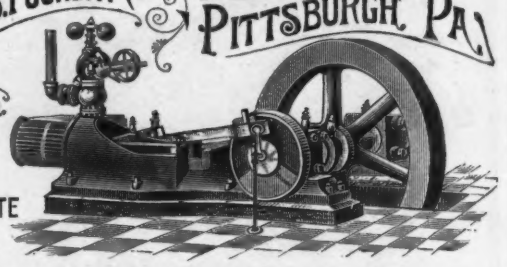
The Schenectady Locomotive Works, of Schenectady, N. Y., will soon commence the erection of a new foundry 100x380 feet.

The Central Electric Light Co., Lexington, Ky., contemplates adding to its boiler capacity and putting in automatic stoker, and the most approved furnace.

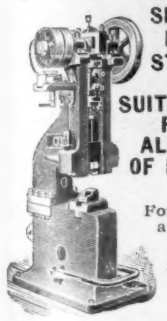
The capacity of the Baker Chain & Wagon Iron Manufacturing Co., of Allegheny City, Pa., will soon be doubled, when the improvements, in the shape of machinery, tools, etc., are completed.

The Philadelphia & Reading will build an extension of 500 feet to its

THE ÆTNA MEDIUM & HIGH SPEED ENGINE
Manufactured by THE TOTTEN & HOGG I. & S. FOUNDRY Co. PITTSBURGH, PA.
150 to 2000 H.P. Latest Design.
FOR ROLLING MILLS AND ALL OTHER WORKS WHERE LARGE POWER AND CLOSE REGULATION IS REQUIRED
CONTRACTS MADE FOR COMPLETE STEAM PLANTS.
ENGINES ALWAYS IN STOCK.



THE HACKNEY POWER HAMMER.



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The Hackney Hammer Co.
CLEVELAND, O.

OFFICE OF
THE STANDARD TOOL CO.
INCREASE TWIST DRILLS, REAMERS, CHUCKS, SOCKETS,
SPECIAL TOOLS AND MACHINERY.
CLEVELAND, OHIO, 1891.

Hackney Hammer Co.,
CITY.
Gentlemen:-
In reference to the one hundred pound hammer that we have of your make we are glad to be able to state that same has given us very excellent results during the year that we have had it in use. We do a great variety of work on same and cheerfully recommend it especially where exact work is required.
Yours respectfully,
THE STANDARD TOOL C O.,
Genl. MGT.

VALVES
Of all kinds for automatically controlling Steam Pressure or Air Brake Pumps,
MANUFACTURED BY
MASON REGULATOR COMPANY, Boston, Mass.

repair shops at Reading, Pa., giving them a total length of 1,250 feet, and employing 800 to 1,000 men, instead of 400 as now. A paint shop, 190x560 feet in size, in which passenger coaches will be repainted, has also been located.

Pittsburgh capitalists are said to be negotiating for the purchase of a very valuable piece of frontage on Walnut street, McKeesport, adjoining the National Tube Works property, on which they intend to build a foundry and machine plant. The name of the company has not been given to the public, but it is stated that it will be removed from Pittsburgh.—[Pittsburgh Dispatch.

The Marion Steam Shovel Co. are enlarging their plant very extensively, having in process of erection a pattern storage room 75x50, two stories high, and a two story building 40 feet square, to be used for Superintendent's office, draughting rooms and blue print room. A new erecting room 200x150 feet, three stories high, with a tower is also being built. As soon as these buildings are finished they expect to commence work on a new wood-working shop 200x100 feet and two stories high.

Fires and Accidents:—

The American Foundry & Machine Co.'s plant at Bowling Green, O., has been burned. The company will rebuild.

At Rock Hill, S. C., the Cochrane Cottonseed Oil Mill and Fertilizer Works burned. Loss, $60,000; insurance, $52,000.

The works of the Colwell & Collins Norway Bolt Co., at Cleveland, burned. Loss on buildings, machinery and stock, $100,000.

At Martin's Ferry, O., the electric light plant, owned by the Martin's Ferry Construction Co., was destroyed by fire. Loss about $25,000; insurance, $15,000.

The iron and brass foundry of Thomas Goddard, Jersey City, N. J., burned and also the adjoining coppersmith shop of Clarke & Sons. Loss about $10,000 in each case.

George B. Duncan & Sons' extensive tableware glass plant on Tenth street, South Side, Pittsburgh, took fire on Wednesday, March 9, and in less than an hour the entire establishment including annex, furnaces, pots, and patterns, were totaly destroyed. Plant was valued at $250,000; insurance $105,000.

The gigantic fly-wheel at the Cincinnati Electric Light Works burst, on Monday, with destructive effect. It was 24 feet high, weighed 24 tons, and was making 73 revolutions per minute. It smashed a $10,000 steam engine, destroyed the office, crushed several dynamos and knocked out one side of the building. Loss about $20,000.

One of a battery of four tubular boilers exploded at the Paige Tube Co.'s works at Warren, Monday night, wrecking the boiler department and riddling the machine shops and welding mills. One man was killed and several badly injured. The gauge showed 95 pounds steam pressure and plenty of water. The boilers were inspected and passed, four weeks ago, by the Hartford Boiler Insurance Co. Loss is $50,000; insurance $25,000.

General Industrial Notes:—

Cambridge, O., it is said, offers a bonus of $25,000 for a rolling mill.

Grand Rapids, Mich., will spend $10,000 on a new pumping station.

Virginia Manufacturing Co, at Suffolk, Va., is building machine shops.

The citizens of Grand Junction, Col., have pledged $100,000 for the purpose of establishing a smelter at that point.

The Marinette Iron Works Co., of West Duluth, Minn., are prepairing to manufacture blowing engines for blast furnaces.

The Moore Manufacturing & Foundry Co., of Milwaukee, Wis., have discontinued the manufacture of hoisting engines.

The Fairchance Furnace, at Fairchance, Pa., is being torn down. It was built in 1887, and had not been operated for two years.

The Westinghouse Electric Co. made a contract at Pittsburgh last week to furnish 200 motors for street railways to a Western syndicate.

The Greenfield, Ind., city council has passed a water-works ordinance, and on April 6 will receive proposals for the construction of a plant at the estimated cost of $25,000.

The Beaumont (Tex.) Car Works has issued bonds to Boston, Mass., parties, and it is said that the buildings will be completed and equipped with machinery in the near future.

About July 1, the Watts furnace, at Middlesborough, Ky., will go into blast. The furnace and rolling mills will give employment to nearly 2,000 men, and will use at least 600 tons of iron ore and 400 tons of coke per day.

In the merchant steel department of the Pennsylvania Steel Co., at Harrisburg, Pa., a large new slabbing mill 300x100 feet, will be erected this season. In connection with this there will be six new basic open hearth furnaces built.

The Lackawanna Iron & Steel Co., of Scranton, Pa., has announced that hereafter, until further orders, their lower steel rail mills will run full time, and the upper mills double time. Fully 300 men will be furnished work by this order.

Ohio capitalists have closed a deal for piping natural gas from wells on the shores of Salt Lake, into Salt Lake City, Utah. The deal includes a controlling interest in the stock of the company and in $5,000,000 bonds. Gas will be brought into the city by September.

At a recent meeting of the stockholders of the Decatur Land Improvement & Furnace Co., of Decatur, Ala., a plan was adopted for the reorganization of the company, which will discharge the entire indebtedness of the company and provide a working capital of $75,000.

The Siemens & Halske Co., of Berlin, Germany, are to build a mammoth electric plant in Chicago. The American branch company has been organized with O. W. Meysenberg, president and A. W. Wright, secretary. It is expected to be a strong competitor to American companies.

A number of capitalists, including Col. A. L. Conger and Attorney F. M. Atterholt, of Akron, O., have purchased 1,000 acres of land at Jonesboro, Ind., and will offer gas leases and other inducements to factories to locate there. The same persons are largely interested in Muncie and Elwood, Ind. Hereafter Jonesboro is to be known as Gas City.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C. until 2 o'clock P. M., April 5, 1892, and opened immediately thereafter, for all the labor and materials required to put in place complete the iron columns, steel and iron floor, ceiling and roof construction, skylight roof complete, etc., for the U. S. Custom House and Post Office building, at Newark, N. J.

The Miami Valley Boiler Co., of Dayton, O., whose works were burned down on the 15th of February, are now engaged in rebuilding, and will have, when it is finished, one of the finest boiler works in the country. At the same time their business goes right on, the building being done around the machinery. They have recently taken some large orders, among them four 100 horse-power boilers, two ice tanks, 90 feet long, and an ice plant at San Antonio, Tex., including three 80 horse-power boilers, and one ice tank.

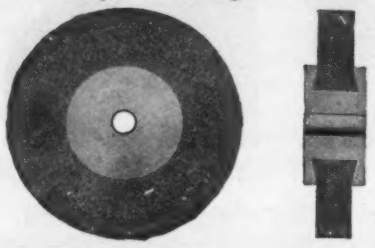
The Carnegies, as already announced in *The Iron Age*, are preparing to equip their Duquesne mill with two or three modern furnaces, so that they can make their billets direct, in one heat from the ore; and now comes the announcement that the Monongahela Furnace plant of two furnaces, which was originally laid out with the view of doubling it, making four The owners of the works, the National Tube Works Co., are the largest makers of tubes and pipes in the world. It is understood that they are convinced that steel must become the metal for their product, which is now entirely made of iron. In preparing for this change they will probably put up the two additional blast furnaces and build a large Bessemer plant.—[Iron Age.

Relative Value of Hot Blast and Cold Blast Iron.

The London *Colliery Guardian*, gives points made by Mr. T. Turner in a lecture on "Cast Iron" recently delivered at Mason College, Birmingham, Eng. Referring to the properties of the variety of iron used for foundry purposes, Mr. Turner stated that ever since the introduction of hot blast there had been a controversy as to the relative value of hot and cold blast iron, and, as not unfrequently happened in such cases, there was a certain amount of truth on both sides of the argument. In order that a metallurgist should be able to tell the suitability of a sample of iron for a given purpose it was not necessary for him to know whether hot or cold blast had been used in its manufacture. All that was necessary was to know the composition of the metal, and to see a fractured surface so as to know that it had been properly cast. It was also true that some of the highest recorded tests had been obtained with hot blast iron, and there could, therefore, be no inherent advantage in cold blast. At the same time, experience extending over a lengthened period was held to justify some of the local founders of best repute in continuing to pay the higher price of cold blast pig. Cold blast iron was, however, only used for special purposes, as in the production of chilled castings where quality was more important than price, where a very small difference in the composition would spoil the product.

THE ACME

Safety Emery Wheel



PATENT METAL CENTRED
EMERY AND CORUNDUM WHEEL.
10 to 36 Inch Diameter.
We also make

Solid Emery & Corundum Wheels.

THE "SAFETY" FEATURE of this wheel is shown in the sectional cut, the material being dovetailed into the metal, insuring immunity from danger in case of wheel bursting. We have run a split wheel 2,8co revolutions per minute, the metallic centre retaining the material in place.

Water Wheels, Cup Wheels, & Special Shapers to Order.

SPECIAL ATTENTION TO SAW GUMMERS.

Discount on all Centres Returned for Refilling. This means Economy. Descriptive Circulars, Price Lists and Catalogues Mailed on Application.

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Acme Safety Emery Wheel Co.,

Corner Fort and Beaubien Streets,
DETROIT, MICH.

MICHIGAN

EMERY WHEEL CO.

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Solid Emery & Corundum Wheels, to Run Wet or Dry, Special Shapes.

Perfection Saw Gummers.

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FOR SALE ONE BABCOX & WILCOX Water Tube Boiler of one hundred and four horse-power—five years use—in splendid condition. Can be seen working for next 30 days.

The F. GRAY CO.,
Piqua, Ohio.

THE
HARRINGTON & KING
PERFORATING
MANUFACTURERS OF PERFORATED METALS FOR
SUGAR HOUSES,
DISTILLERIES, PHOSHATES AND FERTILIZING WORKS
COTTON SEED OIL MILLS
RICE MILLS
METALS
PERFORATED
ELEVATORS, MALT KILN FLOORS, GRAIN CLEANING MACHINERY, GRAINDERS, SEPARATORS, CORN SHELLERS AND ALL KINDS OF
GRAIN CLEANING MACHINERY FOR MINING AND CONCENTRATING WORKS, COAL, COKE AND ORE SCREENS
GAS AND WATER WORKS; PAPER, WOOLEN, FLOUR AND OIL MILLS; FILTERS, STRAINERS, VENTILATORS, ETC. HEAVY STEEL AND IRON
PLATES AND CYLINDERS FOR SCREENING ORE, COAL, STONE, PHOSPHATES, ETC.
AGON. GRIZZLIES FOR PLACER MINING. STAMP BATTERY SCREENS OF REVOLVING SCREENS. ROUND AND HEX
ING. SCREENS FOR ALL KINDS OF ORES. SPECIAL ATTENTION GIVEN TO ALL KINDS AND SIZES.
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MAIN OFFICE AND WORKS
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PERFORATED BRASS. PERFORATED TIN.

AKRON TUBULAR STEEL BARROWS.

STRONG, LIGHT, DURABLE.

Tray Cut from Plates; not Pressed.

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For INVENTORS. 40-page BOOK FREE. Address W.T Fitzgerald, Att'y at Law. Washington, D.C.

SECOND-HAND MACHINERY For Sale.

1 Engine Lathe 25-inch Swing 14-foot Bed.
1 Engine Lathe 18-inch Swing 6-foot Bed.
1 Iron Planer 24" x 24" x 5'.
1 24-inch Back Geared Drill.
1 No. 4 Garvin Plain Milling Machine with Mandrels and Cutters.
1 Whiton Centering Machine.

Above Tools are in First-Class Order.

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Alphabetical List of Advertisers

The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month the double dagger (‡) once in three weeks.

	PAGE
Aitchison, Rob't Perforated Metal Co	15
Adt, John & Son	12
Armstrong Bros	16
American Bridge & Iron Co	14
American Fluorine Co	16
Acme Safety Emery Wheel Co	12
Akron Tool Co., The	12
Burton, W. J. & Co	14
Bischoff, F. F. & Co	16
*Berger Mfg. Co	19
Babcock & Wilcox Co	20
Buffalo Specialty Mfg. Co	18
†Butman Furnace Co	—
Barr Electric Mfg. Co	17
Cleveland City Forge & Iron Co	20
Cleveland Twist Drill Co	20
Cleveland Iron Mining Co	13
Cleveland Rolling Mill Co	13–16
Cleveland Desk Co	13
Condit Fuller Co	13
*Copeland & Bacon	12
Colliau, Victor	18
Canton Iron Foundry Co	14
Cambridge Roofing Co	19
Cole, J. Wendell	20
Chester Steel Casting Co	14
Corrigan, Ives & Co	13
Canton Saw Co., The	20
Deming Co	18
Dixon, Jos., Crucible Co	14
Downerd & Son Co., The J	12
†Downie Bros. & Nevin	—
Egan Co	15
Edison General Electric Co	15
Eberts Bros	20
Eclipse Electrotype & Engraving Co	16
Eller, J. H	19
Frank & Co	18
Fleharty, J. H & Co	16
Fitzgerald, W. T	12
Fellowes, Ernst T	—
Graham Twist Drill Co	20
Garvin Machine Co	15
*Garfield Injector Co	13
Garry Iron Roofing Co	19
Graves, L. S. & Son	14
Gerlach, Peter & Co	13
Hutchison, W. S	20
Harrington & King Perforating Co	12
*Hodell, H. H. & Co	—
Hartford Steam Boiler Insp. & Ins. Co	16
Hackney Hammer Co	11
Hartman Sliding Blind Co	16
Hercules Powder Co	18
Iron Clad Paint Co	19
Industry File Works	20
Jones, E. H. & Co	18
Jeffrey Mfg. Co	14
Jenks, James	12
Kanneberg Roofing Co	19
*Leffel, Jas. & Co	19—
Ladd, Alfred W	17
Land & River Improvement Co	15
Milton Mfg. Co	15
*Munn & Co	15
Michigan Emery Wheel Co	12
Mason Regulator Co	11
*Neracher Sprinkler Co	—
New Philadelphia Iron & Steel Co	13
Outhwaite, J. H. & Co	13
Oglebay, Norton & Co	13
Oldfield, L. H	16
Pope, E. C	13
Parkin & Bosworth Co	20
Palmer, Cunningham & Co	14
Penberthy Injector Co	20
Pollock, Wm. B. & Co	18
Pratt Chuck Co, The	18
Porter Iron Roofing & Corrugating Co	19
Rogers & Hubbard Co	17
Rowell, Geo. P. & Co	15
Reynolds Bros	20
Schleicher, Schumm & Co	18
Sykes Iron Roofing Co	19
Sackman, F. A	14
Southwark Foundry & Machine Co	19
Stirling Co	18
Stilwell & Bierce Mfg. Co	20
Spicer Mfg. Co	15
Shepard, H. L., Agent	17
Skinner Engine Co	19
Stevens, F B	19
*Simpson, Thos. P	—
Sterling Grate-Bar Co	14
*Steele Co., The M	17
Toledo Machine & Tool Co	18
Tod, Wm. & Co	18
Totten & Hogg Iron & Steel Foundry Co	11
Van Duzen Gas Engine Co	16
Upson Nut Co	16
Union Electrotype Foundry	14
Universal Radial Drill Co	20
Unger & Wigham	15
Union Photo Engraving Co	20
Westinghouse Machine Co	19
Wyckoff, Seamans & Benedict	18

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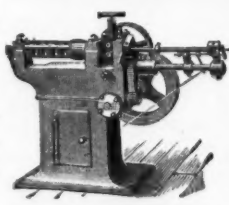

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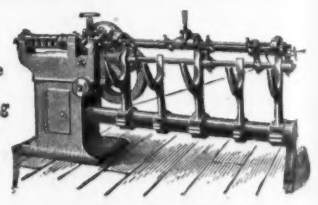
Builders of Machinery for Hardware Manufacture.
Automatic Wire Straightening and Cutting Machines, Butt Milling Machinery, Butt Drilling Machinery, Riveting Machines, Foot Presses, Sprue Cutters. Etc.



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MANUFACTURERS OF

BESSEMER AND OPEN-HEARTH STEEL,

Blooms, Billets, and Slabs. Steel Rails, Steel Beams, Channels and Angles. Steel Forgings Bar, Spring and Sleigh Shoe Steel. Steel Wire of all kinds. Barbed Wire. Iron and Steel Plates. Galvanized and Black Sheet Iron and Steel. Corrugated Iron Roofing.

IRON AND STEEL MARKETS.

PIG IRON.

CLEVELAND (f. o. b. cars, net cash, Bessemer, $15 70; No. 1 Foundry, $15 20; No. Foundry, $14 70; No. 1 Gray Forge, re. short $14 20; No. 2 Gray Forge, neutral, $14 20; No 1 American Scotch, $15 70; No. 2 American Scotch, $14 70.

CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1. foundry, $16 00 @16 75; Southern Coke No. 2 Foundry, $15 00 @15 50; Southern Coke No. 3 Foundry, $14 25 @15 00; Southern Coke No 1, Softeners, $15 00 @15 75; Southern Coke No. 2, Softeners, $14 00 @14 75; Ohio Silveries No. 1, $17 50@18 50; Ohio Silveries No. 2, $16 50@ 17 50; Ohio Strong Softeners No. 1, $17 25@18 00; Ohio Strong Softeners No. 2, $16 75@17 50; Lake Superior Charcoal Nos. 1 to 6, $17 00@18 00; Tennessee Charcoal No. 1, $1700@18 00; Tennessee Charcoal No. 2, $16 50@17 50; Southern Standard Car Wheel, $21 00@23 00; Tennessee Standard Car Wheel, $00 00@00 00.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $14 50@15 00; Southern coke, No. 2 and No. 1 soft, $13 50@$14 00; Hanging Rock Coke, No. 1 foundry, $16 00@16 50; Jackson Co. Stone Coal, No. 1 foundry, $16 50@17 00; Tennessee Charcoal, No. 1 foundry, $16 75@17 00; Hanging Rock Charcoal, No. 1 foundry, $19 75 @20 00. MILL IRONS—Standard Southern Coke, grey forge, $12 25@12 50; Standard Southern Coke, mottled, $12 00@12 25; Cold Short Southern Coke, grey forge, $12 75@13 00; Strong Ohio Neutral Coke, grey forge, $15 00@15 50. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $19 00@20 00; Tennessee Car Wheel, $17 50@18 00; Lake Superior Car Wheel, $19 00@19 50.

BUFFALO (reported by Rogers, Brown & Co.): Mahoning and Shenango Valley strong, No. 1 Foundry, $16 25@00 00; Mahoning and Shenango Valley strong, No. 2 Foundry, $15 25 @00 00; Ohio Softener No. 1, $16 20@00 00; Ohio Softener No. 2, $15 20@00 00; Jackson Co., Silvery No. 1, $18 00@00 00; Jackson Co. Silvery, No. 2, $17 00@00 00; Lake Superior Charcoal, $17 50@18 50; Tennessee Charcoal, $18 25@00 00; Southern Softener No. 1, $15 50@00 00; Southern Softener No. 2, $14 75@00 00; Southern Strong No. 1 Foundry, $16 50@00 00; Southern Strong No. 2 Foundry, $15 50@00 00' Alabama Car Wheel, $19 75@20 75; Hanging Rock Char coal, $21 00@22 00.

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $14 00@14 25; Southern coke No. 2, $13 00@13 50, Southern coke No. 3, $12 75@13 00; Mahoning Valley (Lake ore mix,tures), $00 00 00@00 Southern charcoal, No. 1 $16 00@17 00; Southern charcoal, No. 2, $15 50@16 00; Missouri charcoal, No. 1, $17 00@17 50; Missouri charcoal, No. 2, $16 50@17 00. FORGE—Neutral coke, $12 50@12 75; Cold short, $12 25@12 50; Mottled, $11 50@12 00 CAR WHEEL AND MALLEABLE—Southern (standard brands), $18 00@ 18 50; Southern (other brands), $17 00@ 7 50; Lake Superior, $19 50@20 50.

ST. LOUIS (reported by Rogers, Brown & Meacham): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 25@15 50; Southern Coke No. 2. $14 25@14 50; Southern Coke No. 3, $13 50 @14 00 Southern Grey Forge $13 00@ 13 25. Southern Charcoal No. 1, $17 00@17 50; Southern Charcoal No. 2, $ 6 25@16 75; Missouri Charcoal No. 1, $15 50@16 00; Missouri Charcoal No. 2, $15 00@15 50; Ohio Softeners, $18 00@ 19 00. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $19 50@20 00; Southern, $19 50@ 20 00. CONNELLSVILLE COKE—East St. Louis, $0 00; St. Louis, $5 65

DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $17 00@18 00; Lake Superior (coke) Bessemer, $16 50@17 00; Katahdin (Maine charcoal), $00 00 @00 00; Lake Superior Coke, Foundry, all ore, $17 00@18 00; Lake Superior Coke, Foundry, all ore, $00 00@00 00; Standard Ohio Black Band, $17 50@18 00; Southern No. 1 $15 25@15 50; Southern Gray Forge, $13 50@ 14 00; Jackson County (Ohio) Silvery, $18 00@ 18 50; Old Car Wheel, $00 00@00 00. Connellsville Coke, $0.00.

LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 00@ 14 50, Southern Coke No. 2 Foundry $13 00@ 13 50; Southern Coke No. 3 Foundry $12 50@ 12 75; Grey Forge, $12 00@12 25; Southern Coke Silver Grey, $00 00@00 00; Southern Charcoal No. 1 Foundry, $15 75@16 75: Car Wheel, $18 00@19 00.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $15 25@15 50; No. 2 Foundry, $14 25@14 50; Grey Forge, $13 00@13 25; White and Mottled, $12 25@12 50; Warm Blast Charcoal, $18 00@22 00; Cold Blast Charcoal, $22 00 @27 00; Bessemer, $14 50@15 00.

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Flat Bar

1½ to 4 by ⅜ to 1 inch	1 70
4½ to 6 by ⅜ to 1 inch	1 85
1½ to 6 by 1¼ to 2 inch	2 15
1¼ & 1½ by ⅜ to ¼ inch	1 85
1 & 1¼ by ⅜ to ¼ inch	1 95
⅝, ¼ and ⅜ by ⅜ to ½ inch	2 15

Round and Square.

1 to 1⅞ inch	1 75
2 to 2⅝ inch	1 95
2¾ to 3¼ inch	2 25
3½ to 4 inch	2 75
4¼ to 4¾ inch	3 25
4¾ to 5 inch	3 45

Ova

½ to 1¼ inch	2 15
⅝ to ¾ inch	2 25
⅝	2 55
¾	2 95

Half Oval and Half Round.

⅜ to 1 inch	2 85
⅜ to 1¼ inch	2 45
½ to ¾ inch	3 05
⅝	3 25
¾	4 75

Heavy Band.

¼ to 6 by ¼ and 5-16 inch	1 55
¼ to 1⅜ by ¼ and 5-16 inch	2 05
½ to ⅞ by ¼ and 5-16 inch	2 25
[illegible]	3 75

Hoops.

1¼ to 4, Nos. 13 to 15	2 55
1¼ to 2, Nos. 16 to 18	2 65
1¼ to 2, No. 19	2 75
1¼ to 2, No. 20	2 85
1¼ to 2, No. 21	2 95
1¼ to 2, No. 22	3 05
15-16, I and 1⅛, Nos. 13 to 15	2 75
15-16, I and 1⅛, Nos. 16 to 18	2 85
15-16, I and 1⅛, Nos. 19 and 20	2 95
15-16, I and 1⅛, No. 21	3 05
15-16, I and 1⅛, No. 22	3 15
⅞, Nos. 13 to 15	2 95
⅞, Nos. 16 to 18	3 05
⅞, Nos. 19 and 20	3 15
⅞, No. 21	3 25
⅞, No. 22	3 35
13-16, Nos. 13 to 15	3 15
13-16, Nos. 16 to 18	3 25
13-16, Nos. 19 and 20	3 35
13-16, No. 21	3 45
13-16, No. 22	3 55
¾, Nos. 13 to 15	3 25
¾, Nos. 16 to 18	3 45
¾, Nos. 19 and 20	3 55
¾, No. 21	3 65
¾, No. 22	3 75
11-16, Nos. 13 to 15	3 55
11-16, Nos. 16 to 18	3 65
11-16, Nos. 19 and 20	3 75
11-16, No. 21	3 85
11-16, No. 22	3 95
⅝, Nos. 13 to 15	3 75
⅝, Nos. 16 to 18	3 95
⅝, Nos. 19 and 20	4 05
⅝, No. 21	4 15
⅝, No. 22	4 25
⅝, No. 23	4 45

Light Band.

1⅜ to 6 by ⅛ to 3-16 in	2 20
1⅜ to 6 by Nos. 11 and 12	2 30
1 to 1¾ by ⅛ to 3-16 in	2 40
1 to 1¾ by Nos. 11 and 12	2 50
⅜ and 13-16 by ⅛ to 3-16 in	2 70
⅜ and 3-16 by Nos. 11 and 12	2 80
¼ and 11-16 by ⅛ to 3-16 in	3 00
¼ and 11-16 by Nos. 11 and 12	3 10
⅛ and 9-16 by ⅛ to 3-16 in	3 30
⅛ and 9-16 by Nos. 11 and 12	3 40
⅛ by ⅛ to 3-16 in	3 60
⅛ by Nos. 11 and 12	3 70

Wagon Box Iron.

⅛ inch, beveled edge, by Nos. 11 and 12	2 80
⅛ inch, " " " 13 and 14	3 00
¼ inch, " " " 11 and 12	3 10
¼ inch, " " " 13 and 14	3 30

Sheet Iron.

No. 10 to 14	2 45
No. 15 to 17	2 55
No. 18 to 21	2 75
No. 22 to 24	2 85
No. 25 to 26	2 95
No. 27	3 25
No. 28	3 50

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 25
C No. 1, " "	2 40
C H No. 1 " "	2 50
C H Flange, "	3 50
Extra Flange, "	4 00
Solid Fire Box "	4 75

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 25
Shell	2 50
Flange	2 75
Marine Flange	3 00
Fire Box	4 00

Above includes plates 90 inches wide.

90 to 96 in. wide	¼c lb extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1¼c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs
1 to 2 in. inclusive	08
9-16 to ⅞ in "	08½
7-16 to ⅜ and 2¾ to 3 in	09
3¼ to 4 in	09½
⅝ to 11-16 and 4¼	10
⅞ to 6 in	10¼
¼ to 9-32 and 6⅛ to 7 in	11
5-6 in	13

Flats.

	cts. lbs
2 to 9-16 wide by 2 to ⅝ thick	8

Bessemer and O. H. Steel.

Machinery	base price,	2 35
Tire	"	2 25
Spring	"	2 80
Sleigh Shoe	"	2 50
Toe Calk	"	2 35
Cutter Shoes tapered and burr.	"	2 75

English Tool Steel.

Jessop's	15½
Hobson's "Best"	15½
" "Choice"	15

Burden Boiler Rivets.

⅝, ⅝, 11-16 and ¾ inches diameter 4 00
Bridge ⅜, ½, 11-16 and ¾ inch diam 4 00

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NET TONS	
No. 1 R. R. wrought scrap	$18 00
No. 1 wrought scrap	16 50
No. 1 Machine cast scrap	11 50
Iron axles	23 50
Axle turnings	13 50
Wrought turning (free from cast)	11 50
Cast borings	8 00
Uncut wrought iron boilers	11 50
Steel boiler plates	16 00
Grate Bars	8 00
Pipes and flues (Clean)	12 00
Tank iron	12 50
Hoop and band iron	9 50
Sheet iron	8 50
Wrought drillings	11 00
Malleable iron	9 50

Reported by Messrs. BLACK & POLLOCK, Cincinnati, O.:

Railroad Wrought	$20 00
No. 1 Country Wrought	17 00
Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	[illegible]

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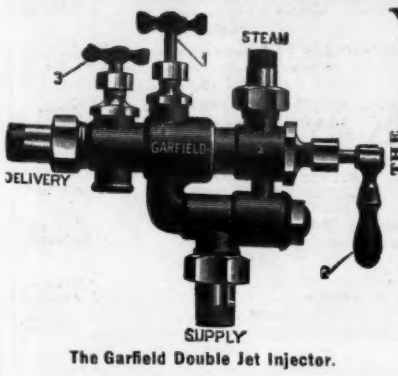

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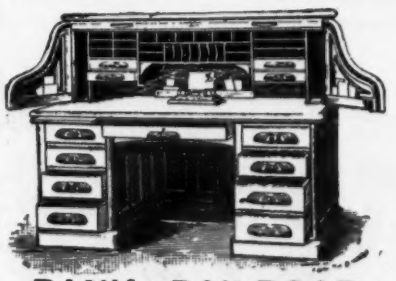

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Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

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Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard.dis 60&10
Shults Raw Hide Leather Belting, single.....dis 40
Shults Raw Hide Leather Belting, double and Light Double.....dis 40
Standard, oak tanned.....dis 50&10
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 12

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

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Twist drills.....dis 50&10
Morse Taper and Straight shank to 1⅛".....dis 50&10
Morse Taper and Straight shank Larger than 1⅛".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

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	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, C. F.
Kegs, ₩ lb	4 c	5 c	2½c
¼ kegs ₩ lb	4¼c	5¼c	2¾c
⅛ kegs ₩ lb	4½c	5½c	3 c
6 lb cans, 10 in case	6 c	6¾c	5 c
6 lb cans, less than 1	10 c	10 c	7½c

Emery Cloth and Paper.

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H. H. Barton.....dis 50@50&10

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
Industry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	2½
Hexagon	15½	11½	8½	6	5½	3½	5
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ₩ lb add ½c., 1lb boxes add 1c to list.

Nails (wire.

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate { Car lots.....$2.30 / Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 48

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ½ inch and over.....₩ lb 15½
Sisal, ½ inch and over.....₩ lb 13½

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40@10
" Band.....dis 20
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 30
Atkins' Cicular Saws.....dis 40&45
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 33c "
No. 1 Handles.....dis 23c per pair
No. 6 " .....dis 16c
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—New List 1890.

Flat head iron.....dis 72½
Round head iron.....dis 67½
Flat head brass.....dis 72½
Round head brass.....dis 65
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ⅛ lb Balls	21c@29c	
No. 18 " " ¼ and ⅛ "	18c@28c	
No. 36 " " ¼ and ⅛ "	16c@27c	
2-Ply Hemp, ¼ & ⅛ lb Balls (Spring Twine	11½c	
3-Ply " " lb Balls	12@12½c	
3-Ply " 1⅛ lb Balls	11@11½c	
Cotton Wrapping, 5 Balls to lb	15@16c	

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 25

Wire.

New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75&5
" " Nos. 27@36..dis 75&10&5
Coppered Nos. 0 to 18, market list..dis 70@70&5
Galvanized Nos. 0 to 18 " ".....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire, regular.....$6.00 ₩ lb dis 5

Wrenches.

Coe's genuine,.....dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10, & 5
Bemis & Call's Combination.....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis
William's " " .....dis
Alligator " " .....dis

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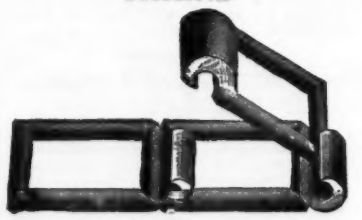

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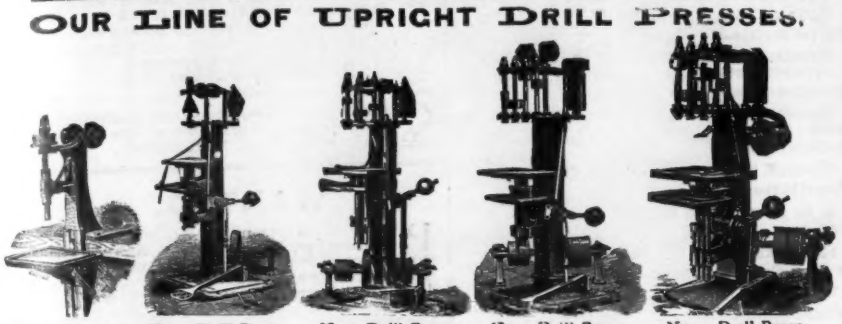

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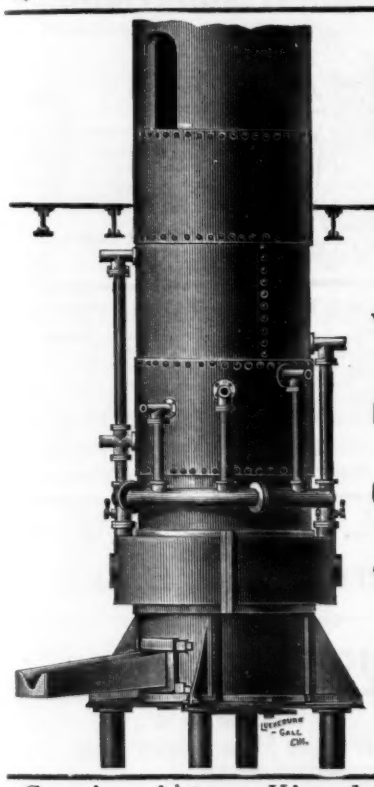

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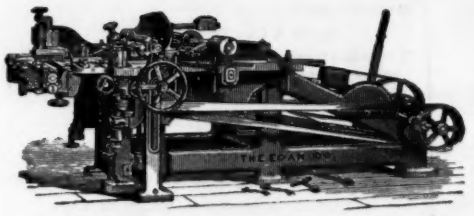

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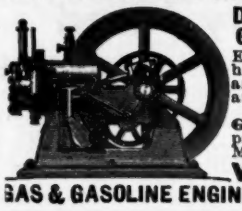

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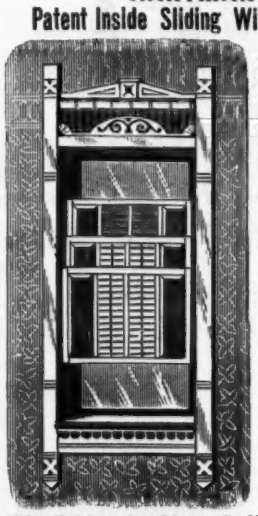

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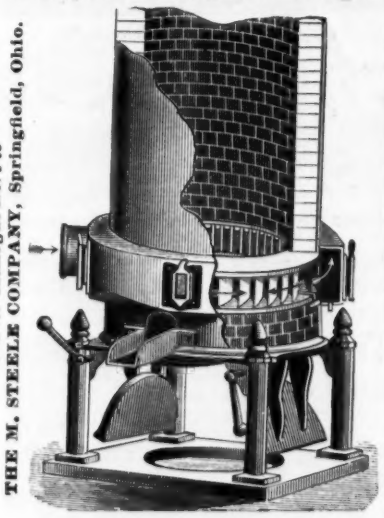

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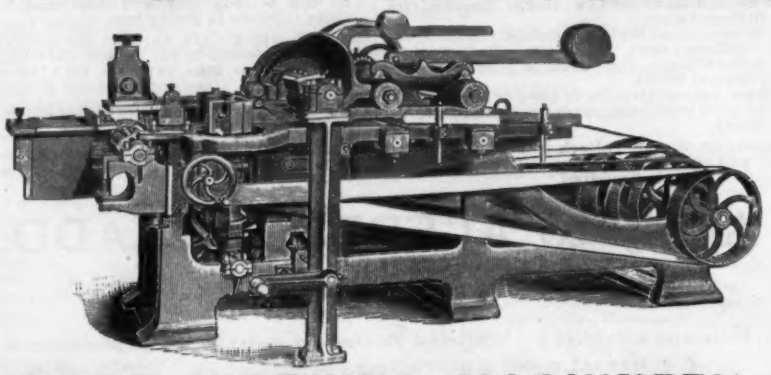

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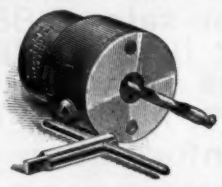

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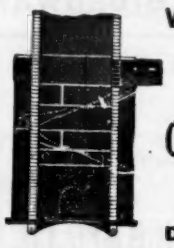

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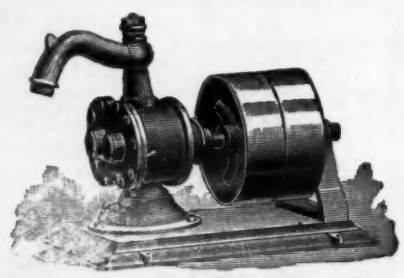

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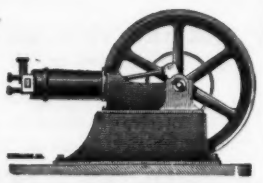

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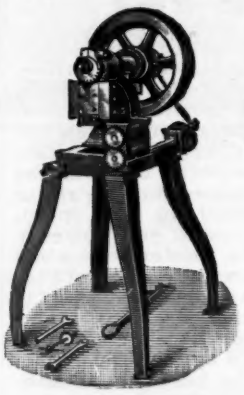

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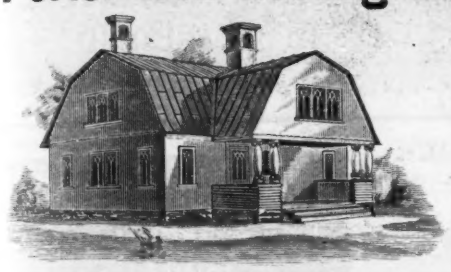

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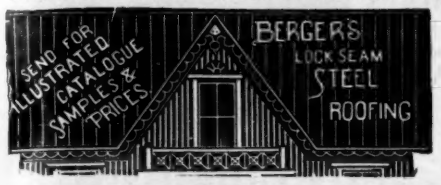

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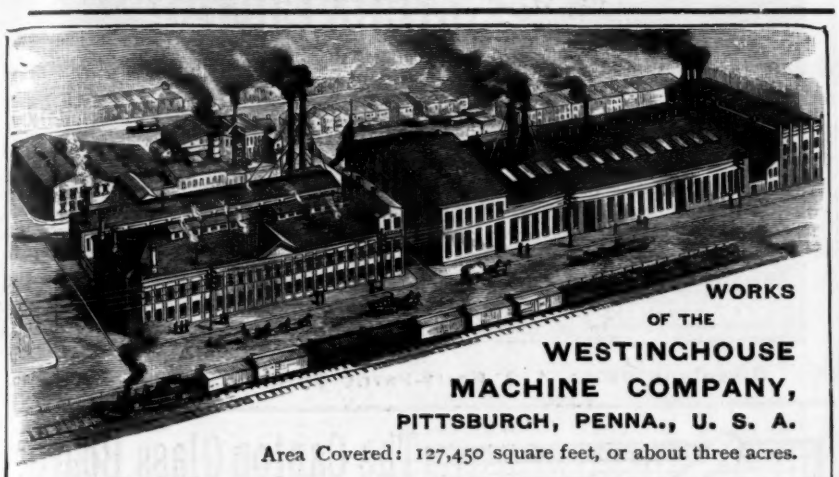

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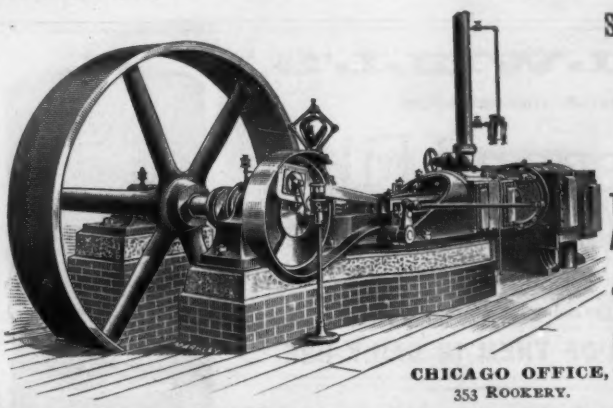

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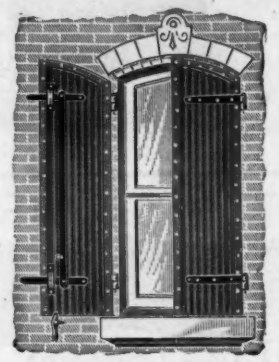

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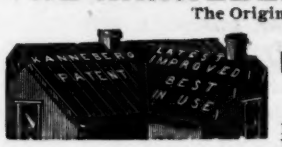

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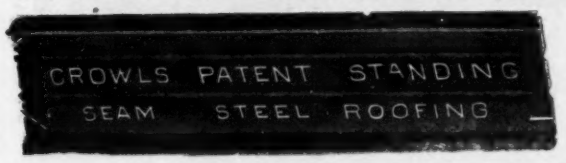

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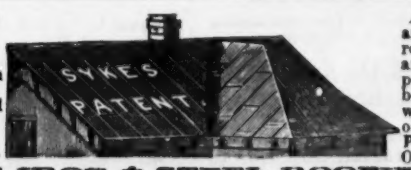

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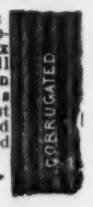

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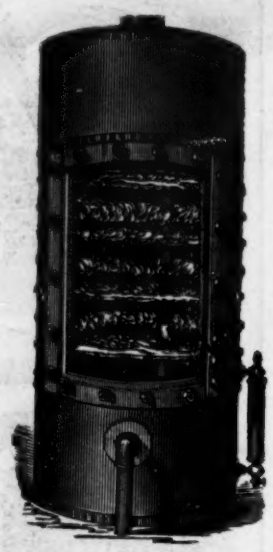

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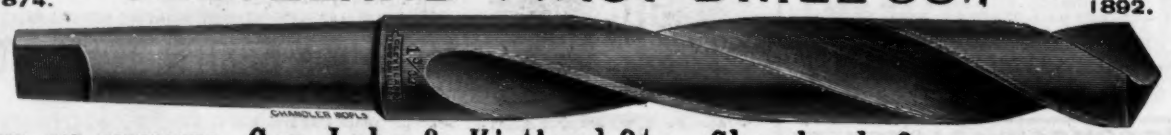

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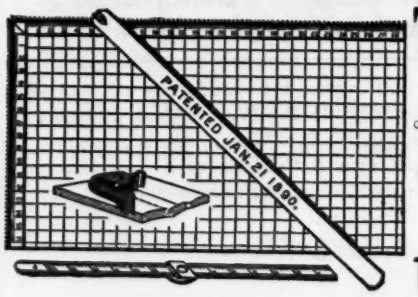

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